A Strategic Theoretical Framework to Safeguard Business Value for Information Systems

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by

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DECLARATION

Student number: 33354618

I declare that "**A Strategic Theoretical Framework to Safeguard Business Value for Information Systems**" is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

……….. ....

SIGNATURE DATE

Mr CD Grobler

ABSTRACT

The phenomenon of business value dissipation in mature organisations as an unintended by-product of the adoption and use of information systems has been a highly debated topic in the corporate boardroom awakening the interest of practitioners and academics alike. Much of the discourse tends to focus on the inability of organisations to unlock and realise the intended benefits to be harvested through large information systems investments. While the business case for investing in large technology programmes has been thoroughly investigated, the human agent that causes value erosion through his interaction with information systems (IS), has not received the studied attention it deserves.

This study examines the use of technology in organisations by considering the dichotomy inherent in IS where its introduction for the purposes of creating new or sustaining existing business value subsequently also inadvertently dissipates value. The study proceeds to investigate the root people-induced causes resulting in the unintentional dissipation of value and presents an empirically validated model suggesting that human agents do not only create value for organisations through their use of IS, but at the same time, deliberately or inadvertently, dissipate value.

The root people-induced causes resulting in the unintentional dissipation of value is delineated within a Theoretical Technology Value Framework that is constructed from a review of the extant literature, and delineates the overall unintentional value destroying causes and effects of IS on organisations. The Theoretical Technology Value Framework is forthwith applied as a basis for the development of a set of questions to support both qualitative and quantitative investigations from which an Archetypical Technology Value Model was derived.

Finally, an Archetypical Technology Value Model is presented as a benchmark and basis to identify, investigate, mitigate and minimise or eliminate the unintentional value destroying effects of IS on Information Technology driven organisations.

The study concludes with implications for both theory and practice and suggestions on how value erosion through the activities of the human agent may be identified, modelled and mitigated. Ultimately, recommendations are offered towards the crafting of more effective IS.

Keywords: Information Technology, Business Value, Value Creation, Value Dissipation, Human Computer Interaction, Technology Acceptance Model, Agency Theory, Critical Systems Heuristics, Mixed Methods Research, Technology Value Model, Activity Theory.

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I thank my Father in heaven without whom life would be meaningless, but with whom life is but a sojourn in anticipation of a future life to be expended in eternal gratitude within His Holy presence!

For we know in part, and we prophesy in part. But when that which is perfect is come, then that which is in part shall be done away. When I was a child, I spake as a child, I understood as a child, I thought as a child: but when I became a man, I put away childish things. For now we see through a glass, darkly; but then face to face: now I know in part; but then shall I know even as also I am known. 1 Corinthians 13:9-12 (KJV)

This thesis was made possible by the love, prayers, inspiration, guidance and support of a number of exceptional individuals to whom I owe a great debt of gratitude. You have inspired me to burn as the cheerful flame captured by C.J. Langenhoven in his poem "Vuurtjie"…

Dis die smorende vuur wat swaarkry
en tog nie die kos kan gaar kry.
Dis die vrolike vlam wat klap en kraak
dis hy wat sy taak tot vermaaklikheid maak
en sy swaarkry met lekkerkry klaarkry.

Rika – You are the love of my life, these past 20 years have been the best years of my life, simply because I was blessed with the providence of living them with you by my side.

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TABLE OF CONTENTS

LIST OF FIGURES

List of Tables

DEFINITIONS OF KEY TERMS

The descriptions below are not claimed to be correct in an absolute sense. Inevitably, particular definitions of the terms will differ outside of this document.

Active Abuse: Encompasses situations where a user determinedly employs the system for personal gain or to perform unauthorised transactions (Author).

Attitude: A learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object. An Individual's positive or negative feeling about performing the target behaviour e.g., using a system (Fishbein & Ajzen, 1975).

Attitude Towards Using Technology: Individual's overall effective reaction to using a system (Author).

Behavioural Intention: The degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour (Fishbein & Ajzen, 1975).

Boundary Judgements: Boundary judgments determine which empirical observations and value considerations count as relevant and which others are left out or considered less important. Because they condition both ‘facts’ and ‘values’, boundary judgments play an essential role when it comes to assessing the meaning and merits of a claim (Ulrich, 2005).

Business Value of Information Technology: The organisational performance impacts of Information Technology at both the intermediate process level and the organisation-wide level, comprising both efficiency and competitive impacts (Author).

Claims: Assertions or suggestions to which we attach some relevance (meaningfulness) and validity (justifiability) in processes of opinion formation, problem solving, decision-making, action or conflict resolution. Typical claims are: a problem definition or an account of a problem situation; a solution proposal; a suggested measure of success or an assumed general notion of improvement; an assertion of moral rightness; a claim to knowledge or to rationality; and so on. All these types of claims are inevitably partial (selective) in the dual sense of representing a part rather than the whole of the total universe of conceivable considerations, and of serving some parties better than others – no proposal, no decision, no action can get it equally right for everyone (Ulrich, 2005).

COBIT®: *Control Objectives for Information and related Technology,* from the Information Technology (IT) Governance Institute (ITGI), is an internationally accepted IT control framework (Available at www.isaca.org).

Computer Anxiety: The degree of an individual's apprehension or even fear, when he is faced with the possibility of using computers (Hackbarth, Grover, & Yi, 2003).

Computer Playfulness: The degree of cognitive spontaneity in microcomputer interactions. It can be considered to be either a state of mind or an individual trait. A *state of mind* is a short-lived cognitive experience felt by the individual. A *trait* represents a characteristic of the individual, which tends to be stable but also slowly changes over time (Hackbarth *et al*., 2003).

Computer Self-efficacy: The degree to which an individual believes that he has the ability to perform a specific task/job using a computer. An estimation of individualized self-percepts that result from dynamic interplay among self-referent thought, affect, and action, or more specifically, the belief that an individual has regarding his ability to execute a particular behaviour (Bandura, 1986; Compeau & Higgins, 1995).

Disconfirmation: The dissonance between users' original expectations and observed performance. Disconfirmation may be positive or negative depending on whether the observed performance was above or below initial expectations, and is viewed as a deviation from the initial expectation (as the baseline or reference level). Disconfirmation and initial expectation jointly determine user satisfaction or dissatisfaction with the product, which then determines continued product usage or non-usage (Bhattacherjee & Premkumar, 2004).

Effort Expectancy (Perceived Ease of Use): The degree of ease associated with the use of the system (Davis, 1989).

Experience: Prior experience of an individual with a specific technology (Author).

Facilitating Conditions (Perception of External Control): The degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system (Venkatesh, Morris, Davis, & Davis, 2003).

Heuristics: The 'art (or practice) of discovery'; the Greek verb '*heuriskein*' means to find or to discover. In professional practice, heuristic procedures serve to identify and explore relevant problem aspects, assumptions, questions or solution strategies, in distinction to deductive (algorithmic) procedures, which serve to solve problems that are logically and mathematically well defined. Professional practice cannot do without heuristics, as it usually starts from ‘soft’ (ill-defined, qualitative) issues such as what is the problem to be solved and what kind of change would represent an improvement (Ulrich, 2005).

Image: The degree to which use of an innovation is perceived to enhance one's image or status in one's social system (Moore & Benbasat, 1991).

Information System(s): A combination of hardware, software, infrastructure and trained personnel organised to facilitate planning, control, coordination, and decision making in an organisation (Available at www.businessdictionary.com). A ‘meaning attribution system’ in which users select certain data and get it processed to make it meaningful in a particular context in order to support people who are engaged in purposeful action (Checkland, 1999).

IS Universe: An IS, understood from a systems thinking perspective, where the system is conceived as a conceptual epistemological construct, most closely aligned with a soft systems tradition (Author).

Information Technology Value Management: The organisational processes, structures and relational mechanisms that enable business and IT to understand, initiate, prioritise, execute, organise, manage and evaluate IT enabled investments and their outcomes, to secure optimal value in the entire IT enabled investment portfolio for the organisation (Maes, De Haes, & Van Grembergen, 2011).

Intentional Sabotage: Designates the purposeful disruption or damage to a system by a disgruntled user (Author).

Job Relevance: Individual's perception regarding the degree to which the target system is relevant to his or her job. The capabilities of a system to enhance an individual’s job performance (Venkatesh & Davis, 2000).

Merit: A pragmatic criterion in the sense of philosophical pragmatism and semiotics. For a claim to have pragmatic merit, it is not sufficient that its formulation is grammatically and logically coherent and semantically clear, it also needs to be relevant and acceptable to those concerned in the light of the real-world consequences that it may have if it is accepted as a basis of action. In order to clarify a claim’s meaning and to judge its merits, we need to examine the question: What difference does it make in practice? Accordingly, issues such as: ‘Who will benefit and who not?’, ‘How does this claim deal with the concerns of those who are not likely to benefit?’ or ‘What is the underlying notion of improvement?’ are to be considered (Ulrich, 2005).

Mixed Methods Study: The collection or analysis of both qualitative and/or quantitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research (Creswell, Plano Clark, Gutmann, & Hanson, 2003).

Modelling: Developing a simplified representation of a system or phenomenon. Such representations may be static or dynamic, in which case behaviour of the system or phenomenon under different conditions can be simulated (Val-IT, 2008).

Objective Usability: A comparison of systems based on the actual level (rather than perceptions) of effort required to complete specific tasks (Venkatesh, 2000).

Organisation, An: A purposeful system that contains at least two purposeful elements which have a common purpose relative to which the system has a functional division of labour; its functionally distinct subsets can respond to each other's behaviour through observation or communication; and at least one subset has a system-control function (Ackoff, 1971).

Output Quality: The degree to which an individual believes that the system performs his or her job tasks well, where tasks are matched to job goals (Venkatesh & Davis, 2000).

Passive Disuse: A user's passive-aggressive attitude towards having to use a particular system, causing the user to avoid interaction with the system (Author).

Perceived Ease of Use: The degree to which an individual believes that using a particular system would be free of physical and mental effort (Davis, 1989).

Perceived Enjoyment: The extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use (Hackbarth *et al*., 2003).

Perceived Usefulness: The degree to which an individual believes that using a particular system would enhance his or her job performance (Davis, 1989).

Perceptions of External Control: The control beliefs relating to resource factors such as time and money and IT compatibility issues that may constrain usage (Lee, Kozar, & Larsen, 2003).

Performance Expectancy (Perceived Usefulness): The degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh *et al*., 2003).

Productivity Paradox: The seeming discrepancy between extremely large IT investments in the economy and relatively low measures of productivity output (Brynjolfsson, 1993).

Quiescent Behaviour: Behaviour displayed by a user where the user either unintentionally misuse a system or simply shirks his obligation to use the system as intended (Author).

Recalcitrant Behaviour: Behaviour displayed by a user where the user either actively abuses the system (for personal gain) or intentionally sabotages the system (Author).

Result Demonstrability: Tangibility of the results of using the innovation, i.e. the degree to which the results of adopting/using the information system innovation are observable and communicable to others (Lee *et al*., 2003).

Selectivity (Empirical): Empirical selectivity is contained not only in the facts considered relevant but equally in the values at work; for in both cases, the issue is not what facts and values ought to underpin a claim but which ones are actually built into it (Ulrich, 2005).

Selectivity (Normative): Normative selectivity is contained not only in explicit value statements (e.g., 'I think we should do X rather than Y' or 'I don't think Z is morally acceptable') but also in assertions of fact ('Fact is …' or 'Let us consider fact A' or 'I don't think fact B is relevant'); for what such statements assert is really which facts should be considered relevant and which others should not (Ulrich, 2005).

Social Influence: The degree to which an individual perceives that *Important Others* believe he should use the new system (Venkatesh *et al*., 2003).

Subjective Norm: A person's perception that most people who are important to him think he should or should not perform the behaviour in question (Venkatesh *et al*., 2003).

Systems Thinking: An active cognitive endeavour with systems conceived as conceptual epistemological constructs most closely aligned with a soft systems tradition (Checkland, 1999).

Technology Value Framework: A value framework used to mitigate, minimise or remove the unintentional value destroying effects of information systems on organisations (Author).

Theory: An abstract entity that aims to describe, explain, and enhance understanding of the world and, in some cases, to provide predictions of what will happen in the future and to give a basis for intervention and action (Gregor, 2006).

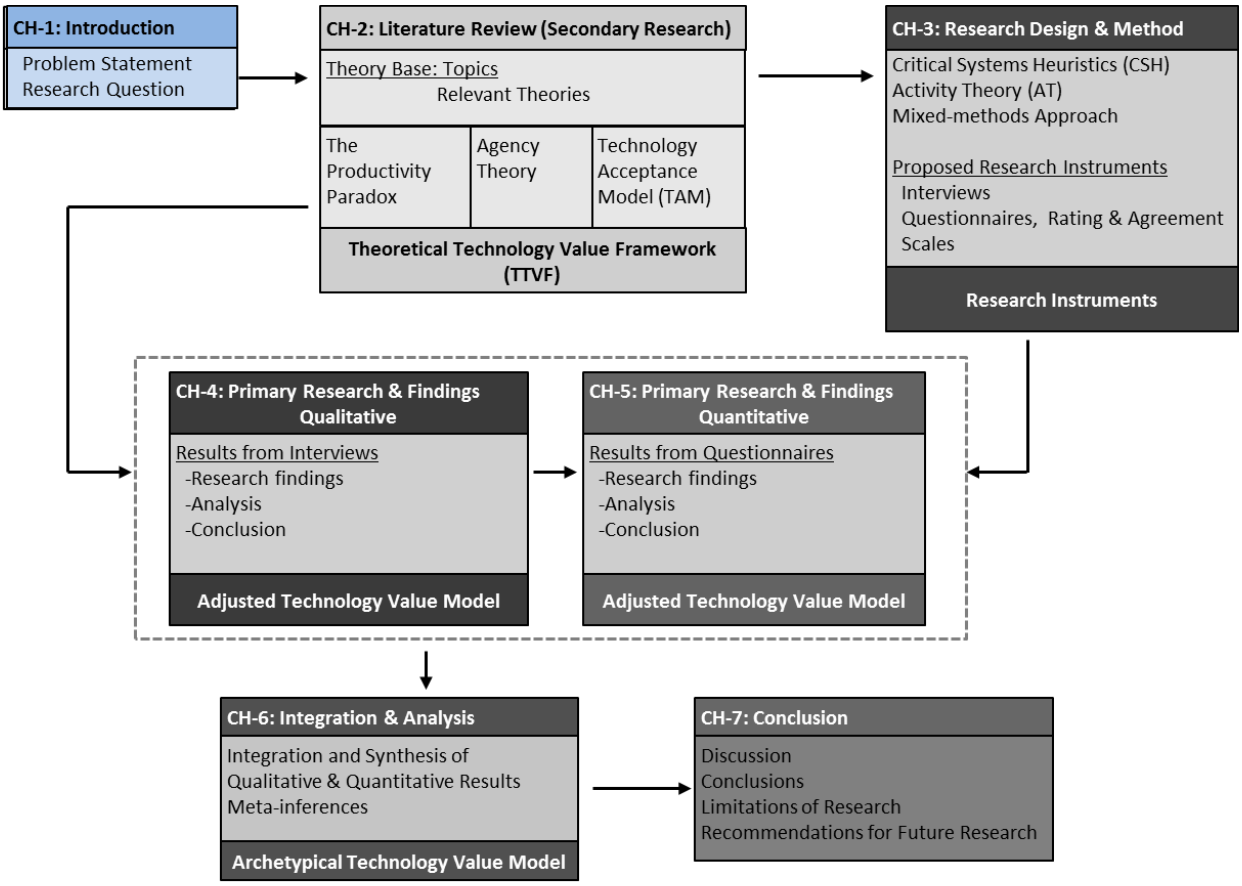
Unintentional Misuse: Actual behaviour where the user is misapplying the system, either consciously or unconsciously, due to a lack of skill or negligence. User skill is a critical IT asset without which the value of the IT portfolio cannot be realised. (Author)

Val-IT™: The standard framework for organisations to select and manage IT-related business investments and IT assets by means of investment programmes to ensure that they deliver optimal value to the organisation (Val-IT, 2008).

Value: Value is complex, context-specific and dynamic. It is the relative worth or importance of an investment for an organisation, as perceived by its key stakeholders, expressed in financial and non-financial terms (Val-IT, 2008).

Voluntariness: The extent to which potential adopters perceive the adoption decision to be non-mandatory, i.e. the degree to which the use of the innovation is perceived to be voluntary or of free will (Venkatesh & Davis, 2000).

CHAPTER 1



CH-1: Introduction
Problem Statement
Research Question
CH-2: Literature Review (Secondary Research)
Theory Base: Topics
Relevant Theories
The Productivity Paradox
Agency Theory
Technology Acceptance Model (TAM)
Theoretical Technology Value Framework (TTVF)
CH-3: Research Design & Method
Critical Systems Heuristics (CSH)
Activity Theory (AT)
Mixed-methods Approach
Proposed Research Instruments
Interviews
Questionnaires, Rating & Agreement Scales
Research Instruments
CH-4: Primary Research & Findings Qualitative
Results from Interviews
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-5: Primary Research & Findings Quantitative
Results from Questionnaires
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-6: Integration & Analysis
Integration and Synthesis of Qualitative & Quantitative Results
Meta-inferences
Archetypical Technology Value Model
CH-7: Conclusion
Discussion
Conclusions
Limitations of Research
Recommendations for Future Research

1. INTRODUCTION

The purpose of this chapter is to provide an outline of the research that was conducted in an effort to answer the following question:

> ***How does the adoption and use of an IS in an organisation, as an explicit value creator, also inadvertently bring about the destruction of business value?***

By removing the auxiliary verb, the question posed is posited as an argument namely:

> ***The adoption and use of an IS in an organisation as an explicit value creator, also inadvertently brings about the destruction of business value.***

Since this argument is accepted to be somewhat 'polemical'[1] (Kant, 1787), it is the intention of the author to support this argument not exclusively through the use of pure reason, but particularly by the evaluation of empirical evidence. For now the argument is accepted to hold both sufficient critical validity and to be rational, i.e. cogent (Ulrich, 1987) to warrant further investigation. The foregoing argument will be expanded within the context of the problem statement and research aim and objectives.

1.1 PROBLEM STATEMENT

1.1.1 Background

The customary introduction of an IS in an organisation causes a ripple effect of changes within the organisation that have both planned or intended consequences as well as unplanned or unintended consequences. The focus of this research effort will be to investigate the unintended consequences that new or existing IS have on a financial institution that is greatly reliant on Information Technology (IT) to run, grow and transform its business.

[1] Kant posits that an argument is polemical if its critical force and its rationality do not depend on any positive validity claim. It aims not at asserting knowledge but only at exposing some dogmatic assertion of knowledge. It need not, therefore, establish a theoretical claim to knowledge or a normative claim to rightness; it only needs to question a claim in an irrefutable manner.

These unintended consequences are expected to possess both negative as well as positive properties that impact on the organisation. The difficulties of motivating, budgeting and evaluating the earned value of IT implementations are partly due to the uncertainty underlying the projected benefits that the implementation of new IT systems will have on the organisation's operations, goals and strategies.

If a strategic model safeguarding business value in technology driven organisations could be incorporated as part of the business case for the adoption of new technology (or the continued support and maintenance of existing technology), a more reliable business case would be made. Much of the expected business value uncertainty could be eliminated if the business case incorporated common detractors to business value as a direct result of Human Computer Interactions (HCI) with IS consumed by the organisation.

An extensive review of the literature has not revealed a comprehensive model that articulates the particular interactions by humans with computers causing direct or indirect business value erosion. The author has subsequently undertook to make a systematic study of this phenomenon and propose a model that may be used by business leaders to both identify value eroding behaviour as well as prevent, detect and correct the behaviour.

Following an investigation into a number of theories pertinent to employee behaviour, a Theoretical Technology Value Framework may be developed. Employees at various levels of seniority from both the business and IT departments within the organisation will be interviewed and thousands of employees will be requested to complete comprehensive surveys, the results of which will be used to validate the Theoretical Technology Value Framework. The Theoretical Technology Value Framework will subsequently be adjusted to reflect the contributions from both the participants and the data from the questionnaire responses. Finally, a comprehensive Archetypical Technology Value Model will be developed that articulates value eroding HCI behaviour and explicit value eroding mitigating measures.

1.1.2 Context

Since financial institutions are historically early adopters of information technology, the past 60 years have seen their technology stacks grow into very complex systems that are not only difficult to understand, but also problematic to maintain, extend or evolve (Murer, Bonati, & Furrer, 2011).

The difficulties of motivating, budgeting for and evaluating the earned value of an IS implementation and operation, are partly due to the unpredictability of the impact that the implementation of a new IS has on an organisation's existing culture, operations, goals and strategies. A key causative tenant highlighted by Sam (2012) holds that while individuals change the material world and society, their existence within these settings also mutually transform these agents and the nature of their interactions with each other.

The unintended consequences of an IS on an organisation will be investigated relative to the reciprocal impact that it has (and the organisational elements have on it) on work processes, reporting structures, sub-culture dynamics, and power & politics. Since these components are all interrelated, a modification in any one of these will have a subsequent impact on the others.

The dualistic nature of an IS, impacting on business value (Silver, Markus, & Beath, 1995), simply describes the phenomenon where an IS not only creates value, but may also to some degree and simultaneously, destroy value. The focus of this research will firstly be to set the context within which this phenomenon exists and then to focus in on the problem of the unintended negative impacts caused by the introduction, adoption and use of an IS. A more accurate statement will read:

> "*to focus in on the problematic situation caused by the introduction, adoption and use of an IS, resulting in unintended negative impacts*".

The latter statement corresponds to the thinking of Checkland & Poulter (2006), in that 'problematic situations' are situations that could be improved. Conversely, a 'problem' by definition requires a solution, which in turn implies that the problem is eliminated permanently, a notion that, although idealistic, is generally unobtainable in practice. The former restriction is partly due to, as Flood (2010) observes, the inability of the observer to fully understand a phenomenon since wholes can never be fully known for the very reason that the observer forms part of phenomenon under investigation.

Gregor (2002) poses that theory firstly provides an answer to our need as humans to make sense of the world, and secondly it accumulates a body of knowledge that aids in the understanding, explanation and prediction of phenomena around us. She concludes that the theory's final contribution lies therein that it provides a basis for action in the real world. A model will be developed that business can use as a lens to study the IS universe and detect or predict the locus of sectors that are eroding or have the potential to erode organisational value. If management has an instrument to predict the unintentional negative impacts of a proposed IS they can factor this into their decision making models and either increase the budget for the development and operation of the IS or subsequently re-evaluate the feasibility of the project. Likewise management can review an existing IS and identify the zones that are eroding value, and moderate or eliminate these to ensure the lifespan of the IS, where it provides optimal value to the business, is extended. Despite the author's attempts to discover the whole truth around the phenomenon under investigation, he was constrained by Hegel's dictum that "*the truth is the whole*", and we simply cannot study the whole (Levins, 1998). While value erosion as a result of the adoption of an IS will be investigated in general, specific attention is placed on the impact that the human element has on value destruction within organisations.

The formulation of a formal research question and supporting secondary questions is the topic of the next section.

1.2 Aim and Objectives of the Study

1.2.1 Introduction

The path leading from IT assets to enduring organisational benefits, if such a path exists, remains a "black box," and exposing the contents of this box is an important topic of research (Melville, Kraemer, & Gurbaxani, 2004; Nevo & Wade, 2010). During a review of the existing literature the author placed specific focus on classical HCI models of which a number have been in existence for decades. This has necessitated a review into older literature and seminal works as the author was interested in the origins of particular HCI models. However, the review of the literature has revealed a dearth of studies investigating the particular actions of the human agent, in his interactions with IS, that give rise to the erosion of business value within organisations. Moreover, a parsimonious HCI model delineating the relationships between the human agents IS and value eroding actions and mitigants had not been developed up till now.

Following on from the opening statement, the focus of this research will be on the inadvertent value impact that the introduction of an IS has on an organisation over the IS lifespan, from conception to decommissioning. It is noted that these consequences may result in both unintended positive as well as negative variations within an organisation.

1.2.2 Aim of Study

Gregor (2006) proposes that academic researchers are meant to develop theory, highlighting this act of theory development as the distinguishing characteristics between academics, practitioners and consultants. The primary aim of this study is to construct an empirically validated model through which the unintended business value dissipating effects on financial institutions, as a direct result of the adoption and use of an IS, may be investigated and moderated. The **unit of analysis**, propounded by Bhattacherjee (2012) to be one of the first decisions to be taken with the inception of a research initiative, is the **IS** and more specifically the **end-user** within the IS.

1.2.3 Objectives

To address the aim of the study, the following objectives will be pursued:

1. To investigate the dichotomy inherent in IS where their introduction for the purposes of creating new or sustaining existing business value subsequently also inadvertently dissipate value.
2. To investigate the root people-induced causes resulting in the unintentional dissipation of value.

3. To construct a Theoretical Technology Value Framework from the literature that generally delineates the overall unintentional value destroying causes and effects of IS on organisations.
4. To apply the Theoretical Technology Value Framework as a basis for the development of a set of questions to support both a qualitative and quantitative investigation from which an Archetypical Technology Value Model could be derived.
5. To contextualise the value dissipating effects on an organisation by pursuing both quantitative and qualitative methods.
6. To present the Archetypical Technology Value Model as a benchmark and basis to identify, investigate, mitigate and minimise or eliminate the unintentional value destroying effects of IS on Information Technology driven organisations.
7. To provide recommendations towards the crafting of more effective IS.

1.3 RESEARCH QUESTIONS

1.3.1 Primary Research Question

Following on from the problem statement, the primary research question may be formulated as follows:

How can the adoption and use of an IS in an organisation, as an explicit value creator, be moderated to prevent it from inadvertently bringing about the concomitant destruction of business value?

This question and the supporting questions are posed within the context of the negative impact that end-users have on organisational value when discontinuing the use of a particular mandated IS (Bhattacherjee, 2001), or making misuse of information within an IS that is intended to drive value creation (Dawson, Watson, & Boudreau, 2010; Linder & Foss, 2013).

The primary research question may be refined as the course of data gathering progresses with time. The scoping of a research project, akin to the scoping of conventional business projects, is subject to the principle of *progressive elaboration,* i.e.

as the research project progresses, an understanding of the research problem, and subsequently primary research question, becomes ever clearer. The primary research question presented the author with a myriad of possible avenues that may be embarked on. In an effort to demarcate the research effort, it is subsequently necessary to deconstruct the primary research question into various secondary research questions. In the following subsection, secondary research questions are developed by drilling down into the essence of what the primary research question attempts to investigate.

1.3.2 Secondary Research Questions

As suggested in the previous subsection, the primary research question is supported by, and will ultimately be answered through, the development and answering of secondary research questions. These questions will form the various research streams that will flow together into a conflux of deeper insight regarding the answer to the primary question. Guided by the principle of progressive elaboration, the secondary questions were refined as the subject under investigation became clearer. The following secondary research questions were investigated as part of the research process:

1. How does the introduction of an IS for the purposes of creating new or sustaining existing business value subsequently also inadvertently dissipate value?
2. What kind of Theoretical Technology Value Framework can be developed from the literature that generally delineates the overall unintentional value destroying causes and effects of IS on organisations?
3. How can the resultant value dissipating effects on the organisation be contextualised and qualified or quantified into an Archetypical Technology Value Model that accurately delineates the overall unintentional value destroying causes and effects of IS on organisations?
4. To what extent may the Archetypical Technology Value Model be positioned as a lens for Information Technology driven organisations that can be generically applied to mitigate, minimise or eliminate the unintentional value destroying effects of IS on organisations?

The aim of this thesis is to develop a model that will address the research problem through the process of clarifying and answering the foregoing research questions.

1.4 RESEARCH OUTCOME

The primary research outcome comprises the realisation of an Archetypical Technology Value Model that can be applied within Information Technology driven organisations as a value-dissipation-lens to detect, mitigate, minimise or eliminate the unintentional value destroying effects of IS on organisations.

1.5 DELINEATIONS AND LIMITATIONS

The scope of research may be delineated as follows: While the topic will be touched on, this work does not consider value dissipation due to technology issues per se. That is to say, instances where technology results in value dissipation, due to incorrect coding or poor architectural integration or network problems etc., fall outside the primary focus of this study. However, technology will be considered within the context of a moderating variable impacting on end-user behaviour.

Next, this study does not consider end-users who are only semi-computer literate, i.e. users who do not possess sufficient skill and knowledge to explore and investigate various IS outside of the primary application(s) utilised to accomplish specific work related tasks. The forgoing implies access to secondary systems. It further follows that a user that is only familiar with one application may still qualify if the user is able to interrogate and/or manipulate the particular application for data or to execute workflow processes that lie outside of the user's scope of prescribed work or duties. Also, this research does not include any longitudinal studies which may provide IS usage trends over a prolonged period of time. Situations where users are involved in user-acceptance testing will not form part of the scope of this study. Finally, environments where IT usage is immature do not form part of the scope of this investigation.

This study will deal with computer literate end-users of IS within the setting of a commercial South African financial institution. Users are all deemed to be voluntary IS users, while partly restricted to the use of proprietary systems when required to perform work-application specific tasks. Both system users and relevant line managers are considered to be willing research participants. Research instruments, i.e. interviews, questionnaires and rating & agreement scales are all conducted anonymously to promote higher and more honest candidate participation. Research instruments focus exclusively on users' behavioural intentions and actions when interacting with IS. Moreover, users' and managers' behavioural perceptions of their peers, and also each other's behaviours (i.e. up and down the reporting line), will be investigated. In conclusion, human technology interaction within the mobile environment is excluded from the study.

1.6 RESEARCH OUTLINE

The research outline is delineated in Figure 1.1, which provides a presentation of the various chapters and the relevant topics contained in each.

Chapter one sets the context for the remainder of the thesis by introducing the problem statement and corresponding primary research question supported by a number of secondary questions. The problem statement and subsequent research questions attempt to capture the phenomenon cited by Silver *et al*. (1995) where users of IS misuse the systems, resulting in value being dissipated from within the organisation.

Within the context of the adoption and use of an IS by end-users, innovated value is proposed to be maximised when the Human Computer Interaction relationship is optimised towards the creation of business value. More specifically this is achieved where users do not intentionally or unintentionally, knowingly or unknowingly disuse, misuse or abuse organisational IS.

Chapter two introduces the phenomenon of the productivity paradox, characteristic of IS, which describes the problematic situation where IT investments only provide diminishing returns or as described from the perspective of this thesis: "inadequate organisational value". Next, the paradox is linked to a number of human behavioural theories and, in particular, Agency Theory, which ascribes productivity and ultimately organisational value dissipation problems credited to employee intentionality and behaviour. Following on from the insights provided by Agency Theory, an empirically validated predictive model of human intentionality is introduced. The Technology Acceptance Model (TAM) provides a tested framework from which human behaviour may be investigated within the environment of HCI. Finally, TAM is utilised as a model against which a Theoretical Technology Value Framework is developed.

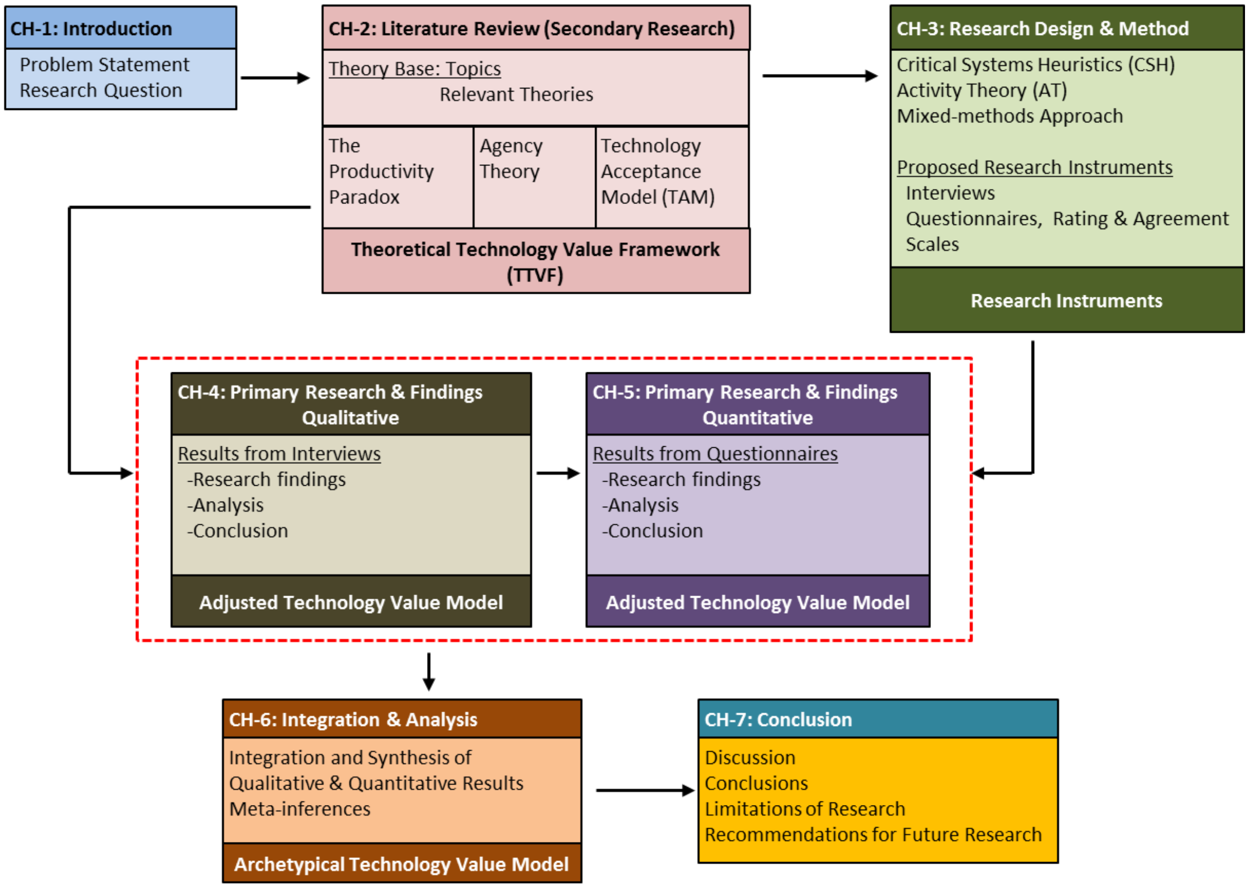


FIGURE 1.1 RESEARCH OUTLINE (AUTHOR)

Chapter three provides a structured method that will be followed to ensure valid and reliable data are gathered in a systematic fashion. Once the method is refined, the Theoretical Technology Value Framework will concomitantly be refined (Chapter four) into an Adjusted Technology Value Model.

The method that was followed finds primary expression within Activity Theory, supported by a component of Critical Systems Heuristics. These frameworks were selected as both have been widely proved to be suitable in the investigation of problematic phenomena related to HCI environments. The chapter moreover introduces a number of research instruments through which valid and reliable data will be collected to provide empiric legitimacy for the Theoretical Technology Value Framework (Chapters four and five) thereby ensuring that it can be applied as a reliable Archetypical Technology Value Model (Chapter six). Data gleaned from interviews, questionnaires and rating & agreement scales are anticipated to both support the legitimacy of the problem statement and provide answers to the research questions.

Chapter four provides an overview of the data gathered via the qualitative instruments i.e. semi-structured interviews, listed in chapter three. An analysis and synthesis of the data is also expected to empirically validate the Theoretical Technology Value Framework.

Chapter five provides a structured overview of the quantitative data gathered via the instruments i.e. questionnaires, listed in chapter three. Questionnaires and rating & agreement scales will be statistically analysed by employing Structural Equation Modelling techniques, and augmented in Chapter six with themed results from the interviews.

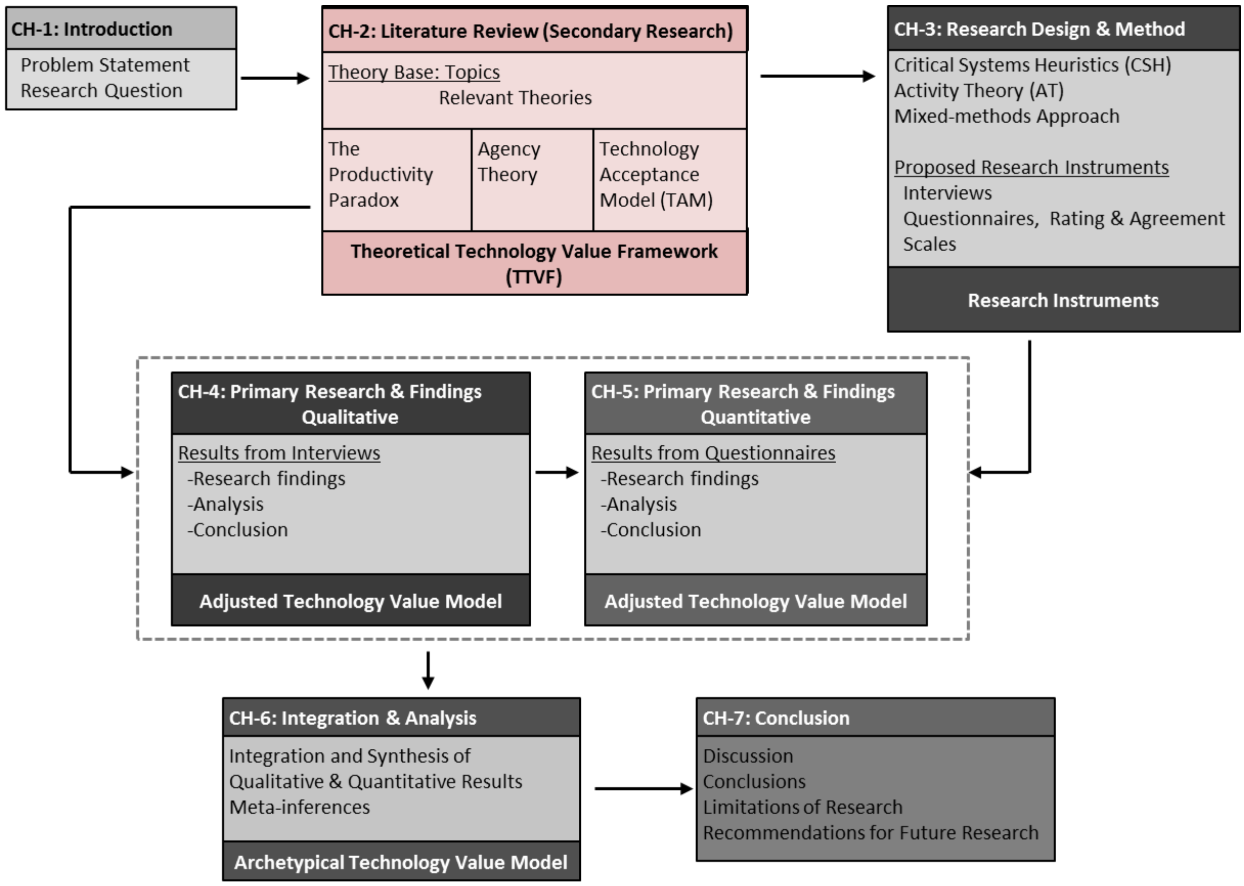
Chapter six provides an integration and analysis of the qualitative and quantitative results. Common themes will be identified and contradictions in the data, both apparent and actual, will be investigated and synthesised or clarified towards an Archetypical Technology Value Model.

Chapter seven will conclude this thesis with a synthesis of the study followed by closing remarks. Finally, the limitation of the research will be presented; completing the thesis with a number of recommendations for future research within the phenomenon of the value dichotomy which describes IS as both a value creator and value dissipater.

1.7 SUMMARY OF CHAPTER 1

This chapter provided a general introduction and outline to the research. Moving from the primary objective of the study, a problem statement was formulated which in turn demanded the development of an appropriate research question and corresponding expected research outcome. The next chapter will review the relevant literature that elucidates and provides theoretical support to the research problem, ultimately closing with the derivation of a theoretical framework.

CHAPTER 2


CH-1: Introduction
Problem Statement
Research Question
CH-2: Literature Review (Secondary Research)
Theory Base: Topics
Relevant Theories
The Productivity Paradox
Agency Theory
Technology Acceptance Model (TAM)
Theoretical Technology Value Framework (TTVF)
CH-3: Research Design & Method
Critical Systems Heuristics (CSH)
Activity Theory (AT)
Mixed-methods Approach
Proposed Research Instruments
Interviews
Questionnaires, Rating & Agreement Scales
Research Instruments
CH-4: Primary Research & Findings Qualitative
Results from Interviews
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-5: Primary Research & Findings Quantitative
Results from Questionnaires
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-6: Integration & Analysis
Integration and Synthesis of Qualitative & Quantitative Results
Meta-inferences
Archetypical Technology Value Model
CH-7: Conclusion
Discussion
Conclusions
Limitations of Research
Recommendations for Future Research

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 INTRODUCTION TO THEORETICAL BACKGROUND

This chapter sets the theoretical background within which the question relating to the phenomenon of an IS as a potential value dissipater will be investigated. Gackowski (2012) cautions that without an explicitly articulated focus and salient points of reference, authors may find themselves in endless confusion when making statements from differing perspectives. He subsequently suggests that the investigation of an unknown phenomenon be characterised by four activities namely (1) identifying the object of interest (the focus), (2) its framework (context), (3) identifying its salient point of reference (the apex of the optical perspective), and (4) establishing a unit of measurement (yardstick) for the results. Kroeze (2009) posits that IS research is by nature interdisciplinary, a view that is supported by Van Biljon (2011) who further observes that IS research focuses on both social and organisational issues when investigating the development and usage of technology within organisations.

Churchman, in Porra (2001), notes that artificial boundaries among disciplines often prevent us from recognizing linkages between theories, thereby restricting the accumulation of knowledge.

With the foregoing in mind, this review will show that the phenomenon of value dissipation within an organisation is informed by a number of disciplines; among other things psychology, sociology, management sciences, economics, information technology, etc. Theories within each of these disciplines are described in general and then defined within the particular framework of IS and specifically as they relate to the question of value dissipation. Since the Human Computer Interaction relationship is positioned within the setting of value dissipation, focus is apportioned to both the value erosion drivers informed by the human component and also that of the IS object. Melville *et al*. (2004) propose a study of the synergies between IS users and IS per se in an attempt to not only understand how these two resources interact but especially their implications on the competitive advantage of organisations. This is supported by Nevo & Wade (2010) who further observe that the basis for competition and strategic advantage among firms are encapsulated by their particular resources.

In an attempt to organise and provide a more integrated view of the concept and research that concerns itself with IS success, DeLone & McLean (1992) introduced a comprehensive taxonomy as shown in Figure 2.1. The taxonomy posits six major dimensions of IS success namely system quality, information quality, use, user satisfaction, individual impact and organisational impact.

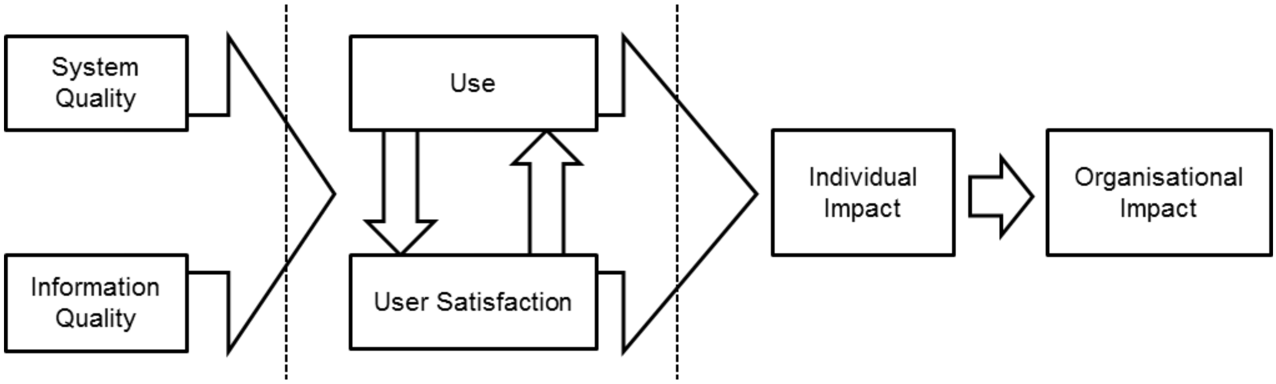


FIGURE 2.1 IS SUCCESS MODEL (DELONE & MCLEAN, 1992)

In a review of the IS success model, ten years after its initial conception, it was updated by its original authors (DeLone & McLean, 2003) to reflect sections of their empirical work which investigated the model's propositions, including consideration of the measurement challenges brought about by the growing e-commerce world. The updated model included six interrelated dimensions of IS success with corresponding proposed directional associations as delineated in Figure 2.2. Enhancements to the original model included the following: (1) *Service Quality* was added reflecting the importance of service and support in successful e-commerce systems, (2) the addition of the *Intention to Use* construct to measure user attitude as an alternative measure of *Use*, (3) The collapsing of the *Individual* and *Organisational Impact* measures into a simpler *Net Benefits* construct.

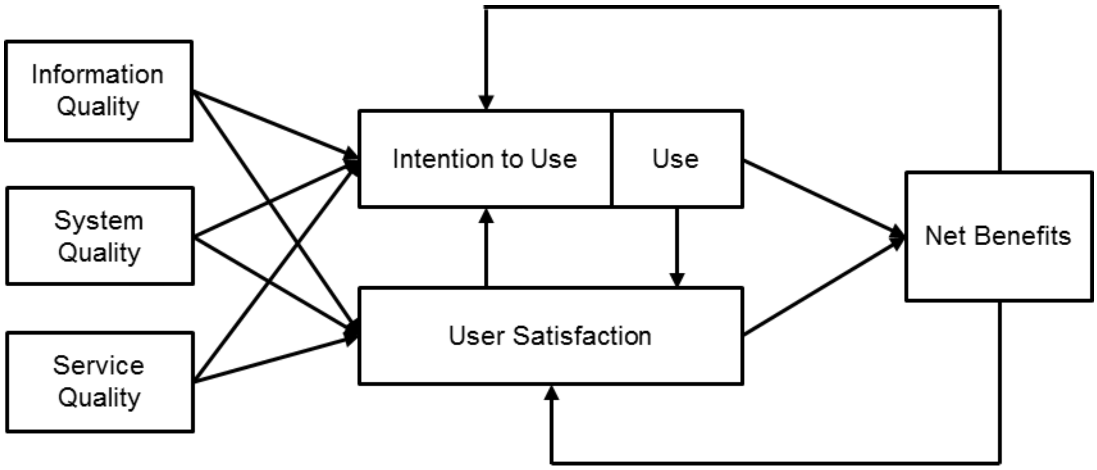


FIGURE 2.2 UPDATED DELONE & MCLEAN IS SUCCESS MODEL (DELONE & MCLEAN, 2003)

Moving from left to right, the Updated DeLone & McLean IS Success Model constructs are described as follows: Information quality describes the desirable characteristics of an IS's output, subsuming measures focusing on both quality of information produced by the system and its usefulness to the user. Information quality is often seen as a key antecedent to user satisfaction (Urbach & Müller, 2012) or as delineated in the Wixom & Todd Research Model (Wixom & Todd, 2005) later on in this chapter – information quality precedes information satisfaction. System quality is defined as the desirable characteristics of an IS, inclusive of usability elements and performance characteristics or as described in the Technology Acceptance Model in a later section, as *perceived ease of use*. The third independent construct (added in 2003) namely service quality, is understood to represent the quality of support that an end-user of a system receives from the IS department and its personnel. Next, the first success dimension namely (intention to) use represents the degree and manner in which a system is utilized by end-users. The dimension embraces both volitional and mandatory system usage environments. DeLone & McLean suggest *intention to use* as an alternative for *use* within contexts where an interpretation of the dimension of use is considered too difficult. Again, TAM proposes the constructs of perceived ease of use and perceived usefulness as independent variables, contributing to attitude toward use, intention to use, and actual use (Urbach & Müller, 2012).

The user satisfaction dimension, considered to be one of the most important measures of IS success (Somers, Nelson, & Karimi, 2003), captures the level of satisfaction that a user experiences when utilising an IS. The final (new) dimension, more specifically net benefits, describes the extent to which the IS is contributing to the success of the respective stakeholders. The construct absorbs the previous dimensions of *Individual* and *Organisational Impact* into a parsimoniously singular measure of net organisational benefits. Within the context of this thesis, net benefits will be accepted to define the net effect of the total value generated, minus the total value destroyed through the adoption and use or misuse of an IS.

This review and ensuing conceptual theoretical technology framework, proposed at the conclusion of the chapter, are consistent with the updated DeLone & McLean model in that both utilization and user attitudes toward the technology is investigated. Moreover, the review especially focuses on the Intention to Use construct of the DeLone & McLean model since it further investigates the behavioural intent of end-users, resulting in IS abuse.

1. Firstly, literature, supporting IS as value drivers within organisations, is reviewed in Section 2.2. For purposes of this document the concepts of business value and organisational value will be considered analogous.
2. Further in Section 2.2, studies suggesting the potential value limitations that IS place on organisations are contrasted to the body of literature supporting the former view. It is also within the latter domain of discussion that this research endeavour seeks to establish itself.
3. Lastly, various specific and contiguous disciplines, theories, models or tools are introduced and contingently placed within the theoretical landscape for further exploration in Sections 2.3 to 2.5. Disciplines, theories, models or tools will be applied to frame the potential value limitations that IS place on organisations. In keeping with the guidance from Suddaby (2010), theories will, subject to their implicit goals and assumptions, be positioned within the appropriate context to ensure relevance to purpose and intent. While some of the foregoing concepts are investigated in depth, a peripheral study of others suffices to support the contextualisation of the research question. Similarly, while a number of theories have proved to provide primary support to this investigation, others were included as periphery support struts, ensuring cohesive stability between primary members.

The literature review moves along an elucidating course, providing an ever clearer and more comprehensive view of the problem under investigation. A topical discussion is dedicated to each disciplinary or theoretical junction, and the junction is then logically synthesised into the primary theme of the relationship between IS and business value. At the end of the journey an integrated summary is provided of the theoretical landscape and the key constructs are positioned and synthesised into a conceptual Theoretical Technology Value Framework.

Seeing that the theoretical framework finds its origins in the Technology Acceptance Model developed by Fred Davis in 1986 as part of his doctoral dissertation and three years later revealed (Davis, Bagozzi, & Warshaw, 1989), an extensive discussion is dedicated to the evolution and validity of this model as a predictor of end-user behaviour.

Since all models are purported to be wrong, limited, misleading (Box & Draper, 1987; Levins, 1998) or, as argued by Checkland & Poulter (2006), models based on a pure world-view cannot accurately describe the real world or as cautioned by Ulrich & Reynolds (2010), no specific proposal or decision or action or system can get a total grip on a situation and get it right for everyone, the conceptual Theoretical Technology Value Framework does not claim panacean capabilities, only utility as a heuristic tool to interpret the phenomenon of an IS artefact as a function of business value erosion.

Through feedback loops the framework endeavours to not only identify, but dynamically correct undesirable value eroding phenomena, thus conforming to Donovan, Tully, & Wortman's (1997) criteria of a model, as having to speak the output language of value. A word of caution is however raised by Allen, Brown, Karanasios & Norman (2013), noting that while feedback resembling forces external or internal to the system may lead to balance or change, these may be realised within intended or unintended ways.

The incongruity problem concerning IT solutions and organisational requirements is a systemic one, touching on a range of themes. In their paper on enterprise system to organisation fit, Strong & Volkoff (2010) identified six domains of misfit referred to in

Table 2.1, namely functionality, data, usability, role, control and organisation. Further, they recognised two types of misfit within each of the domains, more specifically deficiencies (problems arising due to required but missing enterprise system features) and impositions (problems arising due to the inherent characteristics of an enterprise system, e.g. integration and standardisation). Maes *et al*. (2011) argue for an enhanced IT value management approach as a necessary requirement for overcoming the IT productivity paradox. The next section will subsequently explore the relationship between IT value and the productivity paradox.

TABLE 2.1 SIX CATEGORIES OF MISFIT (STRONG & VOLKOFF, 2010)

Misfit	Definition
Functionality	Functionality misfits occur when the way processes are executed, using the enterprise system, leads to reduced efficiency or effectiveness as compared to pre-enterprise system outcomes.
Data	Data misfits occur when data or data characteristics stored in or needed by the enterprise system leads to data quality issues such as inaccuracy, inconsistent representations, inaccessibility, lack of timeliness, or inappropriateness for users' contexts.
Usability	Usability misfits occur when the interactions with the enterprise system required for task execution are cumbersome or confusing, i.e. requiring extra steps that add no value or introduce difficulty in entering or extracting information.
Role	Role misfits occur when the roles in the enterprise system are inconsistent with the skills available, create imbalances in the workload leading to bottlenecks and idle time or generate mismatches between responsibility and authority.
Control	Control misfits occur when the controls embedded in the enterprise system provide too much control, inhibiting productivity or too little control, leading to the inability to assess or monitor performance appropriately.
Organisational Culture	Organisational culture misfits occur when the enterprise system requires ways of operating that contravene organisational norms.

2.2 THE PRODUCTIVITY PARADOX

2.2.1 Introduction

The introduction of an IS is meant to enhance the value created by the organisation (Drnevich & Croson, 2013). This common-sense reasoning is supported by Silver *et al*. (1995) who state that an IS is implemented within an organisation with the objective of creating positive effects and avoiding negative ones. The immediate predicament that is raised by system designers, in contrast to the foregoing statement, is the inability of end-users to articulate their preferences and requirements and moreover, end-users' tendency to change their requirements on the fly and opinions regarding their needs after the system has been implemented (Bedny & Karwowski, 2003).

The problem of increased organisational spent on IT with little realisation of business value has been studied by both theorists and practitioners for decades (Soh & Markus, 1995). In a study of the business value or not, of IS investments, Schryen (2013) reviewed the contributions in 200 research papers and 20 literature reviews, concluding that the overall results have not sufficiently explained how, why and when IS investments create business value. In a similar vein Mitra, Sambamurthy, & Westerman (2011) draw attention to the continued challenge that exists within organisations to measure and communicate IT value, noting that while many IT metrics measure performance, they do not measure actual value.

The question of whether IT spent actually delivers to the anticipated economic benefits is posed by Anitesh Barua, Kriebel, & Mukhopadhyay (1995) and Maes *et al*. (2011) as an important management question, which has not only been left partly unexplained (Schryen, 2013) but also hard to demonstrate and inconclusively answered by past studies (Nevo & Wade, 2010). The latter authors further suggest that a comprehensive study of the literature actually describes productivity gains from IT to be either neutral or negative. Ahmad & Arshad (2014) contributed to the discussion by identifying five major factors that describe the required IT investment value delivery to organisations namely financial, operational, organisational, strategic and service. In his observation on the diminishing return on IT spent, Hammer (1990) proposes that the disappointing results may be due to organisations simply utilising technology to automate old ways of doing business, rather than starting over and developing new more productive processes. Or as Vidgen, Wood-Harper, & Wood (1993) note, the production view of IS quality is often context free, paying inadequate attention to the actual organisational use context of the artefact, signifying software quality as a necessary but not sufficient condition for a quality IS.

In contrast to Gilliland & Wenzky's (2012) suggestion that new technologies should be leveraged whenever they can boost efficiencies or cut costs, authors like Mithas, Tafti, & Bardhan (2012) suggest that while IT enabled revenue growth has a significant impact on firm profitability, there is no equivalent evidence for IT enabled operational cost reduction. To some extent these findings, based on a review of more than 400 global firms, might partially explain the numerous supposedly contradictory results from earlier authors regarding the impact of IT investment on organisational profitability.

2.2.2 The Concept of a Successful IS

It is evident, in line with the observation from Urbach & Müller (2012), that the comparison of IS success is problematical due to different researches focusing on different aspect of IS success. This view corresponds to some extent with work done by Melville *et al*. (2004) who suggest that the application of IT in organisations may have one of three effects namely improve, reduce or have no effect on the value generating process. They subsequently attribute this to the lack of attention in IT business value research to the human component of the IT resource. In a more recent study conducted by Chae, Koh, & Prybutok (2014), they discovered that there was no significant link between IT capability and organisational performance, i.e. organisations who were leaders in leveraging IT capabilities, showed no financial superiority compared to control organisations. This may be partly due to the phenomenon highlighted by (Bala & Venkatesh, 2013) a year earlier where they noted that tension is produced within an organisation due to the introduction of a major IS as the system may not only provide strategic and operation advantages but may also inadvertently produce risks and cause disruptions within the organisation.

Turban & Volonino (2010) observe that despite vast improvements in systems development methodologies, a notable number of IT projects still fail to meet user expectations. Since the 1970’s the increase in systems adoption failures within organisations has motivated researchers to turn their attention to the creation of models that can predict system usage (Chuttur, 2009). Aral, Brynjolfsson, & Van Alstyne (2012), however highlight the irony of the situation by arguing that while ever more information workers focus on processing information, researchers have perpetually less information on how these workers create business value. One underlying reason for this may be provided in the observation by Yousafzai, Foxall, & Pallister (2007a) who noticed that users may outwardly develop intentions to use an IS as they perceive it to be either useful in their job performance, socially important or convenient, yet they may not enjoy using the system and subsequently inwardly retain a negative attitude towards it.

Checkland & Howell (1998) observe that even carefully and cogently designed enterprise wide activities that are carried out in pursuit of organisational goals, by means of a role structure, can never fully coerce or dominate the behaviour or actions of organisational members. Gaibraith (1973) suggests a solution to this dilemma is for the organisation to specify tasks while at the same time allowing employees to select behaviour appropriate for the executing of the tasks. The development of the Technology Acceptance Model was possibly one of the more successful predictive models informing the argument that the value that an IS provided to an organisation was directly proportional to its adoption and proper use by end-users.

While IT may not be perceived as strategic *per se*, Nevo & Wade (2008, 2010) note that Information Technology does play a strategic role within organisations through its participation in the formation of potentially strategic IT enabled resources. This is consonant with Marnewick & Labuschagne (2009) who suggest that strategic mapping, as an organisational value creating tool, should ensure that intangible assets in the form of IT are aligned to an organisation's strategies and ultimately its vison. Only in the case where the introduction of new IT solutions enable an organisation to mobilise other resources, will the investment create value for the firm (Anderson *et al*., 2003). In concert with this condition, Chae *et al*. (2014) propose the adoption of a resource based view where the improvement of business performance is subjected to the accompaniment of other resources, among other things (1) an effective organisational structure, (2) sufficient skills to leverage IS assets for business needs, and (3) a productive organisational culture.

However, prior to any IS solution or tool being deemed appropriate to be positioned for the mobilisation of other resources, it must be adopted and used in an appropriate manner by end-users (Soh & Markus, 1995). Wixom & Todd (2005) applaud the notable streams of research that have been embarked on to investigate the factors and processes that intervene between IS investments and the realisation of business value. They subsequently identify two dominant streams namely user satisfaction and technology acceptance, then propose the integration of these streams to advance the understanding of the manner in which IS features influence IT usage.

2.2.3 Benefits Realisation

Turban & Volonino (2010) note that the successful implementation of an IS is dependent on the proper assessment of numerous individual, technology, task, organisational and environmental factors. A 2002 Gartner (Roberts, 2002) survey found that 20 percent of all expenditure on IT is wasted – a finding that represented, on a global basis, an annual destruction of value totalling about US $600 billion. This survey is supported by research carried out by the Cranfield School of Management which suggests that less than 30 percent of the largest UK companies actually have a formal benefits management process (Peppard & Ward, 2005). Similarly a 2006 study conducted by The Standish Group found that only 35 percent of all IT projects succeeded while the remainder (65 percent) were either challenged or failed (Cook, 2007). Gartner further estimated that these large-scale IT debacles represent the largest major cause of value leakage (Huber, 2002).

As aptly noted by Anderson, Banker, & Ravindran (2003) a “simple correction of existing IT would not add economic value because it would not improve firm productivity.” This principle is supported by Haspeslagh, Noda, & Boulos (2001) and Jensen (2005) who note that senior management need to identify the value drivers within their organisations and then proceed to align the organisation’s key goals to these. The human element, as a value driver is highlighted by Donovan *et al*. (1997) stating that value creation within an organisation will only reach significance once every employee understands his or her role within the context of the organisation, and how it contributes towards value creation. Furthermore, Flood (2010) argues that since subsystems within organisations, comprise people who have lists of needs that must be met, management must ensure that individual motivation is provided the necessary attention it deserves. Moreover, only when employees, who are assigned to meet specified targets, are also included in a committed and understanding process of target setting, can the organisation hope to achieve outstanding performance (Benson-Armer, Dobbs, & Todd, 2004; Smith, Canada, Mckeen, Cranston, & Benson, 2010). On the other hand value inhibitors e.g. conflicts of interest resulting in agent opportunism, will effectively undermine organisational value (Cuevas-Rodríguez, Gomez-Mejia, & Wiseman, 2012).

2.2.4 Computer Usage

Kristekova *et al*. (2012) argue that the ongoing debate regarding the business value of IT extends into a dispute on its effect on business performance. Computer systems cannot improve organisational performance if they are not used. Unfortunately resistance to end-user systems by managers and professionals is a wide spread problem (Davis *et al*., 1989). In addition, users may initially be motivated to use a system but over time their motivation may diminish resulting in system discontinuance. This phenomenon, "acceptance-discontinuance anomaly," was identified by Bhattacherjee (2001), and underlined as a key element undermining organisational efforts directed at the exploitation of IT to generate business value. Practitioners and researchers need to understand why end-users resist using computers (as they were intended to be used) and devise methods to evaluate and improve user acceptance by introducing enhanced systems and an improved approach of introducing the systems (Davis *et al*., 1989).

In his widely cited article on the Productivity Paradox Brynjolfsson (1993) noted an apparent contradiction between the extraordinary advances in computing power and the comparatively slow growth of productivity in, among other things, organisations and specific applications. Brynjolfsson goes on to propose five possible explanations for this phenomenon:

1. **Miss-measurement:** The gains are real, but our current measures miss them.
2. **Redistribution:** There are private gains, but they come at the expense of other firms and individuals, leaving little net gain.
3. **Time lags:** The gains take a long time to be realised.
4. **Mismanagement:** There are no gains because of the unusual difficulties in managing IT or information itself.
5. **Feedback effects:** Lower labour requirements lead to fewer customers, negating any economies of scale achievable with computers (Brynjolfsson, 1993).

In a study conducted by Pinsonneault & Rivard (1998) it is underscored that in order to untangle the paradox, an understanding is required of IT usage as it relates to the nature of managerial work and the particular context within which it is deployed.

2.2.5 Value IT & Change Management

Maes *et al*. (2011) note that a more practice orientated approached for IT value management was introduced by the Information Technology Governance Institute, coined as Val-IT. The Val-IT framework was developed to support executives in achieving a return from large IT investments. Val-IT (2008) holds that the creation of IT-enabled value, by almost any measure, is not easy. The Val-IT development team then goes on to suggest that most enterprises commonly exhibit one or more of the following six symptoms that challenge the creation of value:

1. Problems in delivering technical capabilities
2. Limited or no understanding of IT expenditures
3. Business abdication of decision making to the IT function
4. Communication gaps between the IT function and the business
5. Major investment failure
6. Questioning of the value of IT

Focus is placed on the last bullet as it has direct relevance to the topic of this research. On this point, Val-IT (2008) makes the following statement which is further expounded on later in this section:

> "Ironically, while most enterprises continue to invest more and more in technology, many of their key executive decision makers continue to question whether value is actually realised from these investments. Frequently, the dominant focus is merely on managing IT costs rather than understanding, managing and leveraging information technology's role in the process of creating concrete business value. As IT-enabled investments increasingly involve significant organisational change, the failure to shift

> focus from cost to value will continue to be a major constraint to realising value from these investments." (p10)

Due to the complex and multifaceted nature of computer usage by end-users Davis (1989) notes that it may be accepted that few enterprises actively manage IT for value. Even organisations that attempt to implement professed best practices, find it difficult to link any improvement in organisational value to their efforts. No less because as Neumann (2013) correctly puts it, best practices are in most cases methods that worked well in the past and within a particular context. Moreover, he notes that since everything is not always successful to the same degree, best practices clearly do not always work when we apply them.

Bhattacherjee & Premkumar (2004) note that change is an inevitable and inalienable part of human existence then cautions that any change in an individual's beliefs or attitudes may impact on and even reverse a user's continuance intention and behaviour. The Val-IT development team correctly identifies change management as the key ingredient to the successful implementation or improvement of value management, then goes on to recognise the salient reason positive change eludes enterprise as being the result of organisational inability to persuade groups and individuals to change their behaviour (Val-IT, 2008). If a major IS is to be implemented successfully into an organisation, it is crucial that management understand and manage the perceptions of users as to how the system will impact their work (Bala & Venkatesh, 2013). Neumann (2013) contends that whenever an organisation wants to stop individuals from doing something that infuses them with a sense of integration or development, they need to offer individuals an equivalent alternative that will offer the same feelings of contentment. This counsel moreover requires the change to be accompanied by a proper change management process that includes both management and employees (Kristekova *et al*., 2012). They moreover caution that the organisation's ambition to change should be balanced with its ability to change.

One of the most effective ways to ensure that the constancy of change in an organisation is directed towards a sustainable organisational culture of continuous improvement is to focus the emphasis towards action. Ackoff (1971) notes that learning increases a person's efficiency in the pursuit of a goal under changing conditions. A four-year study published by the Harvard Business School Press (Pfeffer & Sutton, 2000) found that knowledge that is implemented, is much more likely to be acquired from *learning by doing* than from learning by reading, listening or even thinking. The authors further suggest that the management systems and practices in an organisation have a direct bearing on the magnitude of the knowing-doing gap. Following on from this thinking Jackson (2003) argues that, in order for organisations to remain in a position where they learn faster than their competitors, they require both inspired staff and an effectively captured and distributed stock of knowledge within the organisation.

Bridges (2003) identifies four key elements as being fundamental to any effective change-related communications plan:

1. **Purpose** – Answer the questions: Why are we doing this, that is, why do we need change? People resist change when they do not understand the logic behind it.
2. **Picture** – Answer the question: What will it look like when we get there? The picture in people's heads is the reality they live in. Provide vivid and real descriptions of what it will be that people will experience differently in the future work environment.
3. **Plan** – Answer the questions: Do individuals have a clear idea of how they can get to where they need to go? They need to be assured that management really knows what it is doing? There must be a complete and comprehensive plan addressing change on a personal level.
4. **Part** – Answer the question: What is my part in this, both in getting there and after we arrive? People need to participate and contribute in a tangible way. (p60)

Val-IT (2008) cautions management to be especially prepared for the last question.

> "While all four of these elements are important, the last one – What is my part? – is typically the most challenging. In addressing this, ensure careful attention to the alignment of each individual's goals with those of the enterprise. Make sure that not only is the question 'What is in it for me?' answered, but also, and perhaps even more important, take the time to understand and acknowledge what benefits, rights,

privileges or freedoms key stakeholder groups believe they are losing. Resistance to change, whether calculated or unconscious, is a common challenge when working with individuals and groups. Naturally, people question why change is necessary and wonder whether it will hurt them (it is 'loss' that most people fear most of all from change) or how they can gain an advantage from it." (p10)

2.2.6 Unintended Consequences

While the motivation for investing in IT is to generate a positive change, authors like Dewan, Shi, & Gurbaxani (2007) notably state that these investments typically bring about both unintended positive and negative consequences, that are difficult to estimate or foresee at the time of the investment. These sentiments are echoed by Gu, Xue, & Ray (2008) in their statement that since IT is a general purpose technology, it can also act as a constraint or inhibitor to organisational goals. Empirical research performed by Dewan *et al*. (2007) caution that in order to be valid, the returns calculated on an IT investment must take into account a 30 percent IT risk premium due to the riskiness of IT. Gu *et al*. (2008) showed that there is a high correlation between firms who demonstrate good IT governance alignment and the value that IT investments generate.

Soh & Markus (1995) observed that mixed empirical results from IT investments requires a pursuit of better theory to elucidate the path that IT investments take to create better business value. In order to understand IS, the suggestion proposed by Gregor (2006) is adhered to, namely to adopt theory that respectively links the social, natural, and the artificial worlds of human constructions. Their challenge is also the underlying objective of this research.

From the foregoing discussion on the productivity paradox it is evident that the literature on this phenomenon provides for numerous examples where the introduction of technological solutions did not provide the expected business value and in most cases the reasons for this are well documented. However, the literature on the productivity paradox does not provide a framework within which the phenomenon may be modelled or the business value measured. The productivity paradox is subsequently expected to address only numbers one and four of the research questions (refer to Table 2.4). Next, a succinct introduction to the organisational cultural context of IS and IS usage will be provided as a precursor to the agency problem.

2.3 Organisational Cultural Context

2.3.1 Introduction

Neumann (2013) notes that individuals either act based on rationality and discipline or they are motivated by feelings. The creation of organisational value is directly informed by employee and management productivity which in turn is cogently informed by constructive individual and group behaviour. While Hatch & Zilber (2011) boldly observe that organisational culture cannot simply be revealed by its members' behaviour or statements, Cuevas-Rodríguez *et al*. (2012) allow that an apposite understanding of organisational culture will provide an enhanced understanding of the extent to which individuals will either behave opportunistically or be committed to organisational goals. Moreover, not only do the elements that structure the culture define its existence but also the processes of interpretation and continual transformation that combine, mould and direct cultural elements.

Culture may be viewed as a commonly held set of ideas, beliefs and values within a community or group that is subject to an ongoing process of translation (Zilber, 2011). Moreover, within a particular culture the community creates, makes explicit and enforces, certain rules of etiquette social hierarchy and codes of acceptable behaviour (Sam, 2012). A marked differentiation is made by Rao & Ramachandran (2011) between organisational culture, occupational subcultures within an organisation and occupational cultures across organisations. They proceed to show that cultural differences between occupational subcultures may be a source of continued internal organisational conflict. This is supported by Guzman, Stam, & Stanton (2008) who conclude that dysfunctional performance within organisations can be traced back to cultural conflicts. In addition, Robey & Markus (1984) have long since demonstrated that political motives, rather than rational reason, often inform the development of IS as a result of the warping effect that is brought about by culturally dominant rituals. This is consonant with Perrow (1986) who informs this view by noting that there has been a general cultural shift over the last two centuries towards an emancipation of self-interest.

From a HCI perspective, culture is considered to act as a mediator between the end-user and the technology (Bedny & Karwowski, 2003). Rao & Ramachandran (2011) make the point that while IS personnel may request input from end-users, they will just as soon disregard end-user suggestions as they do not believe that end-users have a proper knowledge of the limitations within IT or the processes involved in developing IS solutions. In support Ulrich (2003) points out that having a voice is of no value if the voice can be silenced. He subsequently proposes that the voices of people should be made heard by making them 'competent' and in so doing, relevant for critical purposes.

These assumptions within the IS occupational subculture may lead to problems being experienced by end-users related to IS usability and usefulness. Further, Goodhue & Thompson (1995) strappingly caution that the exclusion of end-users in a system's design will not only negatively impact on user commitment to use the system, but also, although in a completely dissimilar manner, the quality or fit of the subsequent system.

While systems developers and systems supporters may exhibit a naturally positive attitude towards IS within their occupational culture, this may not hold true for other disciplinary subcultures within the organisation. This problem may be exacerbated by employees' natural tendency to migrate towards behaviour that is supported by tacit knowledge of what works, in contrast to new management edicts intended to complement a new IS (Melville *et al*., 2004). Finally, Donovan *et al*. (1997) stress the point that the first step in moving toward a productive culture, necessitates a keen understanding of the existing culture. They proceed to caution that cultural change is difficult and will not simply take place by organisational declaration. An understanding of current culture is complicated by the phenomenon that social reality is not static but, as conspicuously observed by Checkland & Howell (1998), continually constructed and reconstructed by the actors operating and adapting within various organisational situations.

2.3.2 Lazy User Theory

Goodhue & Thompson (1995) identify an understanding of the linkage between IS usage and user performance as a key IS research stream. While Benitez-Amado, Llorens-Montes, & Fernandez-Perez (2014) have demonstrated that IT infrastructure capability increase both talent management and development, resulting in increased organisational performance, lazy user behaviour assumes that IS users will most often pursue a course of action that will require the least effort to obtain a desired outcome. This 'lazy user behaviour' was developed by Collan (2007) into a formal Lazy User Theory. He identifies the salient components informing user selection as *user need* and *user state*. User need incorporates elements of the urgency of information need, type of information required, depth and detail of information sought etc., while user state defines the situational constraints within which the user finds himself at the moment of the need. The state may be bounded by restrictions inherent to the user, e.g. age, intellect, race, gender etc. or environmental factors e.g. location, wealth, access to information alternatives etc. (Collan & Tétard, 2011).

The Lazy User Theory moves from the premise that the user has an articulated need for which a selection of satisfactory solutions, products or services exists. While all of the solutions may potentially fulfil the needs of the user, he will be biased towards those solutions that are perceived as most suitable and usable at a specific place and point in time. Lazy User Theory lastly proposes that the user will pick an option from the selection of satisfactory solutions based on the lowest level of effort. Effort is understood to include some or all of the following elements: time, money or energy (physical and/or mental) used (Tétard & Collan, 2009). They also show that once a user perceives a solution to be the universally least effort fulfilment for a particular need, the user will always favour that particular solution. Even in the event that a new solution is offered that promises a marginal increase in utility, users will show resistance to having to learn a new process of fulfilling the need. The Lazy User Theory is modelled as shown in Figure 2.3.

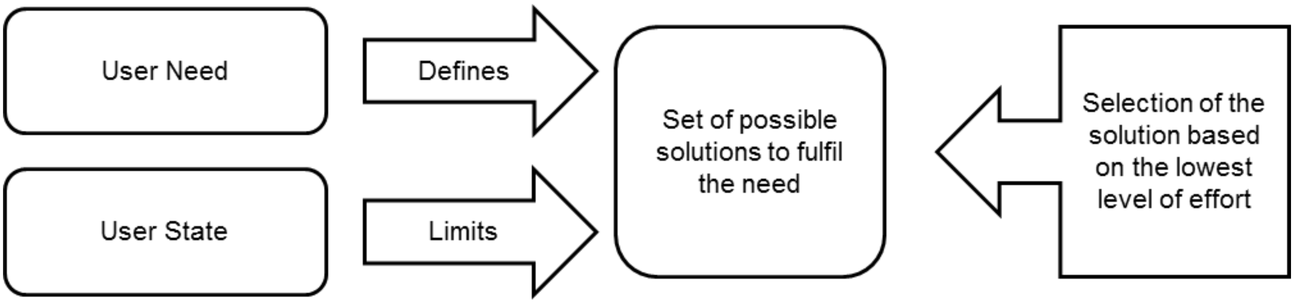


FIGURE 2.3 LAZY USER THEORY OF SOLUTION SELECTION (COLLAN, 2007)

Since Lazy User Theory provides a technique to better understand user acceptance and adoption of technology, within the context of several competing solutions (Collan & Tétard, 2011), it is shown to be closely related to the Technology Acceptance Model (Tétard & Collan, 2009) which is discussed in section 2.5, and has apparent implications on how IS should be designed to ensure least effort by users, and also how users adopt and use these systems. In addition to meeting the user's needs within an environment conducive to productive work, the technology tool provided, to the user, must be fit for purpose, i.e. meet the technology task requirements.

From the foregoing discussion on the lazy user theory it is evident that the literature on this model supports cases where the introduction of technological solutions may not provide the expected positive outcome when utilised by humans. However, the literature on the lazy user theory does not provide a framework within which the value dissipating effects on the organisations may be contextualised or the unintentional value destroying causes and effects measured. While not possessing the requisite attributes to provide a framework, the theory does provide a lens on human activity that may be utilised to mitigate the destruction of value. The lazy user theory is subsequently expected to address numbers one, two and four of the research questions (refer to Table 2.4).

2.3.3 Technology-to-Performance Chain

Since Barua, Konana, Whinston, & Yin (2004) and Soh & Markus (1995) define IT assets as being valuable and scarce, comprising of technology, human resources and the relationship that exists between the IS and the users, it follows that humans, in their capacity as volitional entities, generally dictate the course of the relationship between themselves and the IS.

The Technology-to-Performance Chain model developed by Goodhue & Thompson (1995), asserts that in order for technology to have a positive impact on a user's performance, IS user utilisation is required and alignment between the characteristics of the task that the user has to perform, and the technology needs to exist. Checkland (1999) suggests that the relationship between a task and the technology that supports it will remain a symbiotic one. This relationship was advanced by Melville *et al*. (2004) who suggest that a competitive advantage can be achieved if an organisation ensures that the application of the right technology is applied within the right business processes, subject to complementary workplace practices. Task-Technology Fit seeks to provide an explanation for the impact that technology has on a user's performance. Tétard & Collan (2009) confirm that the Task-Technology Fit measure may be used as a predictor of an improvement in job performance and task effectiveness. Goodhue & Thompson (1995) conclude their Task-Technology Fit research by proposing that Task-Technology Fit be decomposed into more elementary components that could then be constructed into a diagnostic tool to determine whether an IS within an organisation is actually meeting user needs.

From the foregoing discussion on Technology-to-Performance Chain model it is evident that the literature on this model supports instances where the introduction of technological solutions may not provide the expected positive outcome when utilised by humans. However, the literature on the Technology-to-Performance Chain model does not provide a framework within which the value dissipating effects on the organisations may be contextualised or the unintentional value destroying causes and effects measured. While not possessing the requisite attributes to provide a framework, the model does provide a lens on human activity that may be utilised to mitigate the destruction of value. The Technology-to-Performance Chain model is subsequently expected to address numbers one, two and four of the research questions (refer to Table 2.4).

The discussion will now turn to a phenomenon that informs the cultural context of organisations, namely the agency problem, aptly identified by Jensen (2005) as one of the sources of value destruction within organisations. In their commentary on value based management Lew & Barnard (2005) unequivocally state that employees will not be in a position to appreciate the principles of value creation unless they take full and joint responsibility with business owners for the outcomes of business decisions. Fama & Jensen (1983) pre-empted this claim by cautioning that the control of agency problems is essential to the survival of organisations. Agency Theory, which describes the agency problem, delineates a problem structure which is systemic within a wide range of business transactions (Sharma, 1997).

2.4 AGENCY THEORY

2.4.1 Introduction

Argyris (1973a) highlights the disparity where organisations create high economic standards at the cost of their employees' quality of life. Agency Theory contrasts diametrically with the perception that companies display behaviour as value maximising agents, modelled within the disciplines of economics and finance (Jensen, 1994). The theory defines the agency dilemma or principal-agent problem and describes the challenges that the principal party faces when endeavouring to motivate a self-interested employee (Gurbaxani & Whang, 1991), the agent, to act in the best interests of the principal rather than in his own interests. Neumann (2013) observes that when an individual is requested to perform a specific task, he will be motivated by three different conditions. Firstly, he will perform the task if he is forced to, secondly he will perform the task because he knows he has to. Thirdly, he will perform the task purely because he wants to, which is actually the most powerful motivator. The application and popularity of Agency Theory is shown by Linder & Foss (2013) to have found sanctuary within both the disciplines of economics and sociology.

2.4.2 Criticisms against Agency Theory

Criticisms directed towards Agency Theory have been posted by a flow of authors on a range of topics e.g. Cuevas-Rodríguez *et al*. (2012), Donaldson (2012), Hirsch, Michaels, & Friedman (1987), and Perrow (1986). The agency problem within the context of the shareholder-manager relationship (positivist stream) is not the focus of this study but rather that of the employer-employee (Principal-Agent Stream) as defined by Eisenhardt & Eisenhardt (1989). They further note that most criticism in the literature directed toward Agency Theory is specifically focused at positivist Agency Theory. However, even for this stream authors like Harris, Johnson, & Souder (2013) and Heath (2009) cautiously expose a number of misconceptions, showing the value of the theory as a critical-diagnostic tool. Since many agency principles and perspectives are common and complementary (Cuevas-Rodríguez *et al*., 2012) within these two streams, literature from both are investigated.

Heath (2009) emphasizes the tendency of organisations to overstate agency costs, since most human beings can be seen as behaving in a cooperative manner. This is supported by Sharma (1997) who views agents as having mixed, rather than purely self-serving motives. The sentiments of these authors coincide with the views of Stewardship Theory proponents.

2.4.3 Stewardship Theory

While Agency Theory is commonly contrasted to Stewardship Theory, e.g. Donaldson & Davis (1991) and Fox & Hamilton (1994), other authors namely Davis, Schoorman, & Donaldson (1997) make a good case for reconciling these two apparently opposing theories. They conclude that the agency relationship between the principals and the agents or stewards may not be systemic within an organisation but rather situational, dependant on the choices that each party makes as to the nature of their association based on *a priori* perceptions of the other party (Davis, Schoorman, Donaldson, & Schoorman, 1997).

While the central focus of this section is on Agency Theory, the comparison in Table 2.2, from the paper by Davis, Schoorman, & Donaldson (1997) will be discussed and developed to position Stewardship Theory in relation to Agency Theory.

TABLE 2.2 COMPARISON OF AGENCY THEORY AND STEWARDSHIP THEORY (DAVIS, SCHOORMAN, & DONALDSON, 1997)

Line		**Agency Theory**	**Stewardship Theory**
1	Model of Man	Economic man	Self-actualising man
2	Behaviour	Self-serving	Collective serving
3	**Psychological Mechanisms**		
4	Motivation	Lower order/economic needs (physiological, security, economic) Extrinsic	Higher order needs (growth, achievement, self-actualisation) Intrinsic
5	Social Comparison	Other managers	Principal
6	Identification	Low value commitment	High value commitment
7	Power	Institutional (legitimate, coercive, reward)	Personal (expert, referent)
8	**Situational Mechanisms**		
9	Management Philosophy	Control orientated	Involvement orientated
	-Risk Orientation	-Control mechanisms	-Trust
	-Time Frame	-Short term	-Long terms
	-Objective	-Cost control	-Performance enhancement
10	Cultural Differences	Individualism	Collectivism
		High power distance	Low power distance

<u>Line 1: Model of Man</u>: Agency Theory portrays employees as agents holding a preference towards a station of *homo-economicus*, acting in a rational and narrowly self-interested manner. While this assumption of human nature is rather unflattering, Heath (2009) has shown this to be necessary in the development of positive theory of the organisation arguing for individuals' predisposition to generally apply deontic constraints, i.e. principles associated directly with actions, independent of their consequences, to behavioural intention. In contrast, Stewardship Theory presents employees as stewards showing partiality towards a comportment of *homo-reciprocans*, acting in a cooperative and self-actualising manner in an effort to improve their environment.

<u>Line 2: Behaviour</u>: Since the agent does not closely identify himself as an integrated part with his organisation, he may strive to manipulate the environment in a self-centred effort to accomplish his personal objectives. In comparison, the steward identifies closely with the organisation and will strive to enhance the interest of the organisation.

Line 3: Psychological Mechanisms: Individuals who find themselves trapped within an organisation that is designed within an economic centred paradigm will either suppress their ambitions to aspire to greater achievement, and in so doing create a self-fulfilling prophecy or, alternatively, find themselves unable to accept their circumstances and withdraw and begin to display aggressive behaviour towards the organisational administration (Argyris, 1973b). Within the environment of HCI this hostile attitude towards the organisation could present itself through the quiescent unintentional misuse of IS or outright recalcitrant behaviour where the organisation's technology is actively abused by the end-user and used against itself. Turban, Bolloju, & Liang (2010) draw specific attention to the pervasiveness of employee participation in social networking and the corresponding misuse and/or abuse of company internet resources resulting in lowered productivity.

Line 4: Motivation: A distinction is made between extrinsic and intrinsic motivation. The former is recognised within Agency Theory as the base against which contracting takes place and monetary performance rewards are defined. The respective parties will negotiate around short-term and long-term financial rewards and implied job security as compensation for the agent's services. Conversely, intrinsic motivation forms the premise of Stewardship Theory suggesting that the agent is incentivised by intangible rewards like career growth, affiliation to individuals with situational status, goal achievement and self-actualisation.

Line 5: Social Comparison: Agency Theory creates a context within which an agent's sense of fairness, relative to the principal's conduct, is based on the comparable treatment of other agents within the same or a similar context. Stewardship Theory places both the steward and principal within the collective, arguing that the principal will be accountable to, and act in goodwill towards the collective, of which the steward is a member.

Line 6: Identification: Agents will tend to socially and psychologically distance themselves from the organisation by delineating explicit boundaries between shortcomings within the organisation and their personal lives. The success or failure of the organisation will be seen as distinct and separate from their contributions and efforts. By contrast, stewards demonstrate high value commitment towards the organisation through their identification with, and view of, the organisation as an extension of themselves (Donaldson & Davis, 1991). Since the goals of the organisation become intrinsically weaved into the goals of the steward, the success or failure of the organisation becomes indistinguishable from that of the steward. In the course of psychologically distancing themselves from the organisation, agents may inadvertently feel themselves detached from organisational computer artefacts, creating an environment where these artefacts may more easily be misused or abused for personal gain.

<u>Line 7: Power</u>: The power motive within the context of an organisation is defined by McClelland & Burnham (1976) and more recently by Fleming & Spicer (2014) as a resource manifested by the psychological need to influence others towards the accomplishment of valid and acceptable goals that may either be shared or contested. However, the latter authors caution that power may produce both desirable and undesirable behaviour. Within the context of the agency-steward impasse, power can be further separated into institutional, organisational or positional power (*de jure*) and expert, referent or personal power (*de facto*). The positional power that is vested within the principal, by virtue of his rank in the organisation, serves as the basis of influence and control over the agent; as a means to motivate the agent to conform to the goals and desires of the principal. In situations where the agent may feel prejudicially repressed or controlled by the principal, he may attempt to counter or modulate the situation by abusing the information differential that exists between the two parties, through the withholding of important facts from the principal or simply delaying the passing on of urgent information.

While Agency Theory does not concern itself with principal opportunism (Dawson *et al*., 2010; Perrow, 1986), it may be a very real catalyst for reciprocal agency behaviour. The situation may be further exacerbated if, as observed by Flood (2010), individuals with formal power detach themselves from patterns of interrelationships and emerging problems to which they in fact have a systemic relationship and moral responsibility. On the other hand, when the agent's perception of the principal is that of someone who demonstrates a preference toward an emphasis on personal power, he will seek to establish a stewardship relationship with the principal. Although this relationship typically develops over an extended period of time, it can likewise also be sustained over a longer period of time.

<u>Line 8: Situational Mechanisms</u>: Situational mechanisms define the organisation's structured culture within which positional power is used to effectively drive action that may either predispose members to principal-agent relationships or key principal-steward relationships.

<u>Line 9: Management Philosophy</u>: The preference of the principal towards a dominant management philosophy will be determinant as to his orientation towards trust and risk. A control-orientated approach may prompt the principal to implement stricter controls commensurate with the increase in risk and in so doing mitigate organisational vulnerabilities and the subsequent need for trust between the principal and agent. While this is accepted as an effective short term cost control strategy, an agent may perceive the increase in controls as an indication of diminishing trust and reciprocate by exhibiting a decline in commitment. An involvement-orientated management approach strives to address the problem of an increase in risk by empowering employees through training and the establishment of tighter relationships of trust between the principal and steward. The corollary to this is that the relationship between the parties is enriched and the principal's personal power augmented.

<u>Line 10: Cultural Differences</u>: Cultural differences innate to principals and employees are categorised by Hofstede (1993) within two opposing dimensions namely individualism and collectivism. The former describes the degree to which individuals prefer to act on an individual (self-interested) basis as opposed to collective action that necessitates action that is subject to the norms established within a group. In addition to these differences he furthermore highlights the culturally situated phenomenon of power distance which he defines as: "the degree of inequality among people which the population of a country considers as normal: from relatively equal (that is, small power distance) to extremely unequal (large power distance)". The higher the power distance

within the culture the more likely the principal-employee relationship is to polarise towards a principal-agent relationship.

2.4.4 Development of Agency Theory

Sharma (1997) notes that: “Agency Theory is founded on a triad of agent opportunism, information and risk”, where opportunism may present itself as active namely a deliberate misrepresentation of facts or effort, or as passive, where the agent simply withholds or delays key information from the principal (Dawson *et al*., 2010). The survival of an organisation is dependent on the effective control of agency problems by the incumbent principals (Fama & Jensen, 1983). Agents may not only purposefully act in self-interest during the course of their duties and responsibilities, but may even intentionally generate reports that will omit any specifics on negative operational results or distance themselves from negative outcomes. However, in the case of a positive result they may manipulate the reporting process to ensure they are credited with any successful outcomes. While Abrahamson & Park (1994) support the former notion, they caution that in some cases agents will, due to their optimistic nature, *conceal* disagreeable truths from themselves and subsequently unintentionally report inaccuracies that communicate optimistic messages to principals.

The agent may mislead the principal on two levels as noted by Linder & Foss (2013): Firstly, by exploiting the information asymmetry between the two parties and initially overstating his skills and knowledge, the so called *ex ante* (hidden characteristics problem) and, secondly, by withholding effort or engaging in actions that are not valued by the principal, so called *ex post* (hidden action problems).

The primary focus of Agency Theory revolves around two key problems. The first develops from the situation where a conflict exists between the desires and goals of the principal (employer) and the agent (employee); and the second where assurance required by the principle regarding the extent to which the agent is not exploiting the principle, but acting in his best interests, becomes complex or expensive. This deviation leads to a suboptimal outcome and ensuing ‘agency cost’. Gurbaxani & Whang (1991) defines agency-cost as the costs that arise from the discrepancies that exist between the interests and objectives of the principal and the agent. This cost includes monitoring costs, (i.e. the cost incurred by the principal to monitor the activities of the agent) bonding costs, i.e. the opportunity cost incurred by the agent while doing administrative work and, lastly, a residual loss which is the loss incurred by the principal despite monitoring and bonding activities.

Monitoring activities may not be cost effective as the principal will firstly need to isolate the activities of the agent before it can be assessed and supervised and, secondly, the agent may become hostile if he feels that he is constantly being observed within a Panopticon setting, lending intentionality to shirking behaviour. In addition the principal is faced with the challenge of ensuring that the agent does not only focus on tasks/dimensions that are being (easily and parsimoniously) measured, to the detriment of other important tasks. Within a system user context and as an alternative to monitoring, Ferguson, Green, Vaswani, & Wu (2013) propose an IT governance framework that drives desirable IS user behaviour, and ensures IT objectives and goals are realised in an effective and efficient manner.

Figure 2.4 depicts the natural increase in agency costs as decision rights are decentralised and pushed down to the agent. This may be due to either the principal's inability or lack of motivation to verify whether the agent is serving his own interests or that of the employee (Abrahamson & Park, 1994). Conversely, decision information costs decrease since the agent has the information at hand to make decisions. The dilemma, however, is that the agent may be motivated to act on self-interest when making decisions, forcing the principal to centralise the decision rights. This is problematic since the prevailing information asymmetry favours the agent (Sharma, 1997) and, particularly, in the case where agents are professionals functioning in a knowledge-based society (Dawson *et al*., 2010).

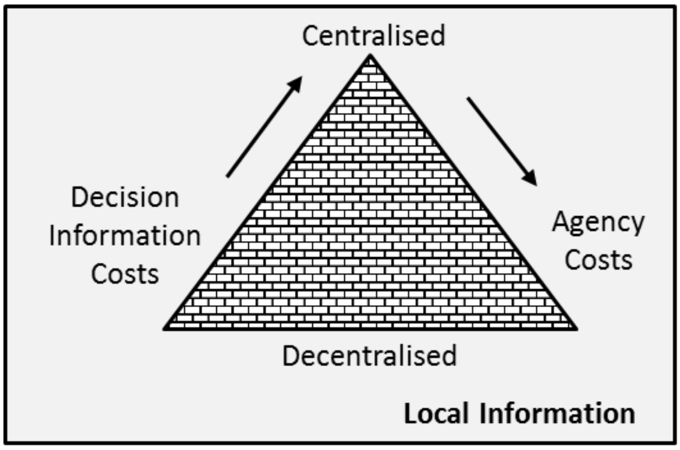


FIGURE 2.4 LOCATION OF DECISION RIGHTS AND COSTS TRADE-OFF (GURBAXANI & WHANG, 1991)

Gaibraith (1973) notes that the employment of a hierarchy is necessary but not sufficient to manage the information flow within an organisation. Management also needs to implement rules which subordinates must follow in the absence of management guidance. Hierarchy in itself holds a systemic weakness in that each link has a finite capacity for handling information which may cause unwanted delays in communication. Delays may be caused in the upward transmission of information for decision making or through downward directives by management to employees. If the principal does not have pertinent information at hand for appropriate decision making, he will subsequently require the agent to process data through the use of appropriate IS to generate management information dashboards. This however increases the cost of decision information. Opportunity cost relate to suboptimal decisions being made due to delays in pertinent information or poor quality information. It follows that decision rights should be located at the point where the internal coordination costs are minimised. Table 2.3 clearly shows the dependency on IS which both Agency Costs (Monitoring costs) and Decision Information Costs have. A word of caution is raised by Jensen (1994) who identifies a second source of agency cost, which he explains to be self-control problems that are innate to the agent, where the agent displays non-functional behaviour, bringing harm to both himself and those around him.

Moreover, there exists a tension between the principal and the agent, owing to their divergent attitudes to risk, resulting in differing preferences toward a specific course of action (Eisenhardt & Eisenhardt, 1989). This tension may be exacerbated as cautioned by Dewan *et al*. (2007), stating that the introduction of Information Technology into an organisation contributes materially towards the organisation's overall risk.

TABLE 2.3 HIERARCHICAL COORDINATION (GURBAXANI & WHANG, 1991)

Internal Coordination Costs	**Agency Costs**	-Monitoring costs -Bonding costs -Residual loss
	Decision Information Costs	-Information processing costs • Communication • Documentation -Opportunity cost due to poor information

As noted, the contract that governs the relationship between the principal and the agent forms the unit of analysis for Agency Theory. The impasse for the principal exists therein that while it is necessary to delegate decision making power to the agent, the principal cannot be assured that the agent will align his decisions to the interest of the principal (Gurbaxani & Whang, 1991). One suggestion for the management and control of important decisions within the agency environment is to create a decision structure wherein the process is controlled (Fama & Jensen, 1983). Checkland & Howell (1998) suggest that individuals generally make decisions subject to limited or bounded rationality. Bounded rationality refers to the limitations placed on the rationality applied in the decision making process of an individual due to constraints imposed on the individual by limitations on information available, cognitive ability and time. The aim of Agency Theory is to identify the "most efficient contract governing the principal-agent relationship given assumptions about people (e.g., self-interest, bounded rationality, risk aversion), organisations (e.g., goal conflict among members), and information (e.g., information is a commodity which can be purchased)" (Eisenhardt & Eisenhardt, 1989).

Since agency cost negatively impacts both the principal and agent, both parties are motivated to reduce this cost. Jensen (1994) proposed the term, *conservation of value principle*, to describe the force that incentivises rationale self-interested parties to ensure that the sum of the cost for writing and enforcing contracts are minimised, since it is uneconomical to endeavour to enforce all contracts optimally. Within the context of the principle-agent phenomenon, Eisenhardt & Eisenhardt (1989) propose ten contract scenarios listed below:

1. When the contract between the principal and agent is outcome based, the agent is more likely to behave in the interests of the principal.
2. When the principal has information to verify agent behaviour, the agent is more likely to behave in the interests of the principal.
3. IS is positively related to behaviour-based contracts and negatively related to outcome-based contracts.
4. Outcome uncertainty is positively related to behaviour-based contracts and negatively related to outcome-based contracts.
5. The risk aversion of the agent is positively related to behaviour-based contracts and negatively related to outcome-based con-tracts.
6. The risk aversion of the principal is negatively related to behaviour-based contracts and positively related to outcome-based contracts.
7. The goal conflict between principal and agent is negatively related to behaviour-based contracts and positively related to out-come-based contracts.
8. Task programmability is positively related to behaviour-based contracts and negatively related to outcome-based contracts.
9. Outcome measurability is negatively related to behaviour-based contracts and positively related to outcome-based contracts.
10. The length of the agency relationship is positively related to behaviour-based contracts and negatively related to outcome-based contracts.

In summarising the above points within the context of an end-user of an IS as the agent and his manager as the principal, the following proposition may be offered:

> If an employment contract is outcomes-based, namely the agent is metered by the principal or if the manager is privy, namely through monitoring, to information on the work behaviour (typically through the control of an IS) of the end-user, he is less likely to either opportunistically or calculatingly abuse the system. There subsequently exists

> less of a goal conflict between the parties. When the end-user is confident of what he can deliver, he is more likely to accept risk and be willing to accept an outcome-based contract. Conversely, the end-user will be unwilling to accept risk if the contract is outcomes-based, while the manager will be more inclined to shift risk to the end-user if the contract is outcomes-based. If an employment contract is behaviour-based, the manager must be in a position to specify appropriate behaviour of the end-user in advance or, alternatively, if the contract is outcomes-based, the manager must be in a position to adequately measure outputs from the end-user. Finally, over time the relationship that develops between the manager and the end-user will place the manager in a position to be more attentive to the behaviour of the end-user, subsequently enforcing the outcomes-based contract scenario.

Agency Theory can also be included as a useful theory when studying complementary theories such as organisational theory, especially the idea that Agency Theory generates around the impact that IS have on organisations (Eisenhardt & Eisenhardt, 1989). They conclude that unique insights may be gained into IS in organisations through the application of Agency Theory.

From the foregoing discussion on Agency Theory it is evident that the literature on this model supports instances where the introduction of technological solutions may not provide the expected positive outcome when utilised by humans. However, the literature on Agency Theory does not provide a framework within which the value dissipating effects on the organisations may be contextualised or the unintentional value destroying causes and effects measured. While not possessing the requisite attributes to provide a framework, the model does provide a lens on human activity that may be utilised to mitigate the destruction of value. Agency theory is subsequently expected to address numbers one, two and four of the research questions (refer to Table 2.4).

2.5 USER ACCEPTANCE OF TECHNOLOGY

2.5.1 Theory of Reasoned Action

The focus will now shift from general employee behaviour to behaviour demonstrated by employees, specifically as users of IS. A number of complementary theories and models that describe this behaviour are discussed as context to the development of a conceptual Theoretical Technology Value Framework.

The discussion subsequently moves from the external reality of the agency problem to the internal, often subconscious, intention that drives human behaviour as defined by the Theory of Reasoned Action which formed an integral basis for the formulation of the Technology Acceptance Model. The Theory of Reasoned Action model was formulated by Fishbein & Ajzen (1975, 1980) to predict generic human behaviour as a construct of behavioural intention, which in turn is informed by the constructs of attitude and subjective norm as illustrated in Figure 2.5. Although applicable to the study of IS usage behaviour, the Theory of Reasoned Action is not confined to the domain of end-user computing but rather explains behaviour across a wide range of domains (Davis *et al*., 1989). Moreover, they caution that since the Theory of Reasoned Action is a generic model, beliefs are not specified for a particular behaviour and must subsequently be identified within the context of the behaviour under investigation.

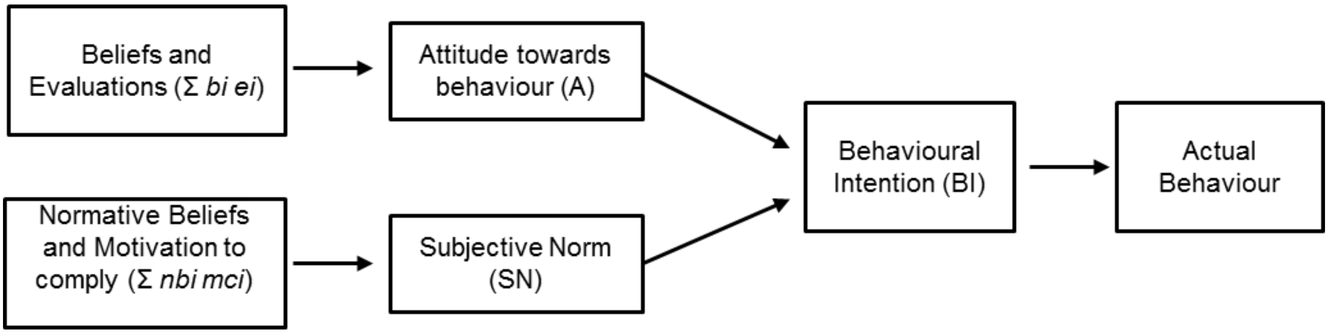


FIGURE 2.5 THEORY OF REASONED ACTION MODEL (DAVIS *ET AL*., 1989)

Proceeding from right to left in the Fishbein and Ajzen model, Actual Behaviour (observed overt acts) is described as being contingent on a person's intention prior to the display of the behaviour, where Behavioural Intent (conation) can be defined as an individual's intention to perform a defined behaviour. Neumann (2013) observes that humans will either act based on rationality and discipline or they will be motivated by their feelings. The subsequent separation of behavioural intention from behaviour itself allows for the explication of limiting factors on attitudinal influence (Fishbein & Ajzen, 1975). In turn, Behavioural Intent (BI) is an outflow of both the Attitude towards Behaviour that the individual displays towards the specific behaviour as well as the Subjective Norm (SN) associated with the defined behaviour. They further proposed the Attitude towards behaviour (A) to be understood as the sum of the product of all the salient beliefs (b_i) about the consequences of performing the defined behaviour, and an evaluation (e_i) of the particular consequences, as presented in the equation below:

$$A = \Sigma\, b_i\, e_i$$

Subjective Norm is defined as an individual's perception of whether most individuals who are important to him would approve of a certain behaviour or not (Fishbein & Ajzen, 1980). It can similarly be shown to be the sum of the product of an individual's normative beliefs (nb_i), i.e. the perceived expectations of significant referent individuals or groups, and his motivation to comply with these expectations (mc_i). When united, these elements provide an equation for measuring the Subjective Norm that is associated with actual behaviour.

$$SN = \Sigma\, nb_i\, mc_i$$

In considering both the user's attitude towards behaviour and subjective norm, the behavioural intention, i.e. a person's relative strength of intention to execute behaviour, that flows out from these two constructs, is depicted as follows:

$$BI = A + SN$$

Since this is a general model it does not articulate the beliefs that drive a specific operational behaviour (Davis *et al*., 1989). Fishbein & Ajzen (1975) caution that attitudes towards behaviour and subjective norms are not weighted equally in predicting behaviour, but are dependent on the individual and the situation. In summarising the above formula within the context of an end-user of an IS and his behavioural intention to make use of a particular IS, the following proposition can be made:

Attitudes: The end-user may hold a multiplicity of attitudinal biases towards a particular IS. He may believe the IS to be either user-friendly or onerous to use, a valuable tool or a waste of time, aligned to his work or misaligned to his needs etc. Each of these beliefs must be weighed against the user's personal preferences within a particular situational setting.

Subjective Norms: The end-user's norms may be directly or indirectly influenced and shaped by a number of individuals or groups within his social and work environment. Again, the influence that the individual's peers have on him by voicing their negative attitudes towards a given IS, may carry more weight than his reporting manager's efforts to promote it. This may prompt the end-user to develop an atypical bias towards using the IS.

Behavioural Intention: The end-user's intention is a function of both his attitude toward the usage of the system and subjective norms toward his IS usage behaviour, which is shown to predict actual usage behaviour. Thus his attitude towards using the IS, combined with the subjective norms about IS usage, each with their own weight, will guide his intention to use the IS (or not), which will then manifest into his actual behaviour.

It follows that the interaction which exists between the IS and the end-user within the context of an organisational system, does not take place equitably in terms of behaviour. While the IS cannot behave outside of a set of predefined coded rules, the end-user's behaviour may only be loosely bounded by a set of possibly inconsistent norms. Over time, the Theory of Reasoned Action has been revised and extended by Ajzen (1991) into the Theory of Planned Behaviour.

From the foregoing discussion on the Theory of Reasoned Action it is evident that the literature on this theory supports instances where the introduction of technological solutions may not provide the expected positive outcome when utilised by humans. However, the literature on the Theory of Reasoned Action does not provide a framework within which the value dissipating effects on the organisations may be contextualised or the unintentional value destroying causes and effects measured. While not possessing the requisite attributes to provide a framework, the theory does provide a lens on human activity that may be utilised to mitigate the destruction of value. The Theory of Reasoned Action is subsequently expected to address numbers one, two and four of the research questions (refer to Table 2.4).

2.5.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (Figure 2.6) concept was proposed by Ajzen (1991) as a means to improve on the predictive power of the Theory of Reasoned Action by including the construct of Perceived Behavioural Control. He proposes that it is at the level of beliefs that one learns about the unique factors that prompt one person to engage in a particular behaviour of interest while another follows a different course of action. The extension to the Theory of Reasoned Action covers non-volitional behaviours for predicting behavioural intention and actual behaviour. The theory states that attitude toward behaviour, subjective norms, and perceived behavioural control, together shape an individual's behavioural intentions and behaviours. Within the context of this discussion the Theory of Planned Behaviour is understood as the tie that links beliefs to behaviour. Ajzen's Theory of Planned Behaviour model, accounting for actual behavioural control, can be delineated as follows:

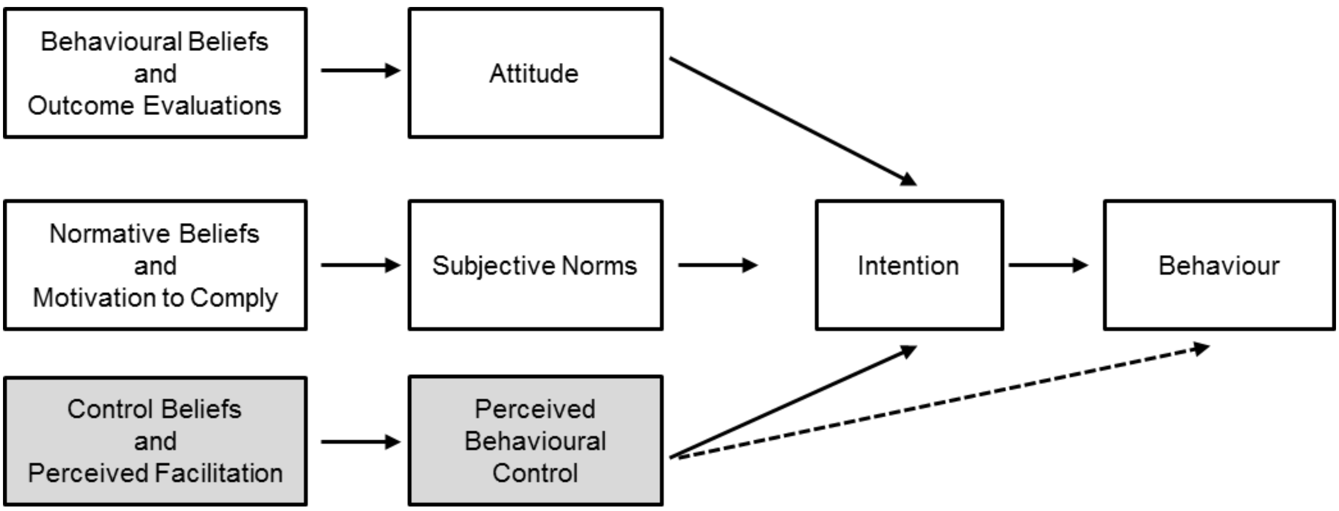


FIGURE 2.6 THEORY OF PLANNED BEHAVIOUR (MATHIESON, 1991)

In addition to the indirect effect mediated by intention, the dotted line that directly links perceived behavioural control to behaviour, is described by Bhattacherjee (2012) as the situation where an individual may have an intention to perform a given behaviour, but due to a lack of resources is unable to act on his intention. Within the context of an end-user of an IS, the perceived behavioural control construct may be explained as follows: While the end-user will demonstrate good intention to make use of a particular IS in a productive manner, due to a lack in confidence or control over his behaviour, he does not follow through on his worthy intention.

Mathieson (1991) conducted a comparative study between the Theory of Planned Behaviour and TAM, concluding that both models demonstrated good predictive ability for IS usage, with TAM having a slight empirical advantage. The study further demonstrated that while TAM was easier to apply, it only provided general opinions regarding users' intention to use an IS compared to the more specific detail represented by the Theory of Planned Behaviour.

The review now turns to the development of TAM that, similar to the Theory of Planned Behaviour, has been demonstrated to be suitable for the prediction of system usage (Chuttur, 2009). Moreover, Venkatesh, Davis, & Morris (2007) note that the development and trajectory of the Theory of Planned Behaviour has been remarkably similar to that of TAM, including: common themes of replication and generalizability, predictive validity, competing models, theory base for the study of unique problems, temporal dynamics and other contingencies, determinants and other interventions, construct refinement and alternative mechanisms, and lastly, synthesis.

From the foregoing discussion on the Theory of Planned Behaviour it is evident that the literature on this theory supports instances where the introduction of technological solutions may not provide the expected positive outcome when utilised by humans. However, the literature on the Theory of Planned Behaviour does not provide a framework within which the value dissipating effects on the organisations may be contextualised or the unintentional value destroying causes and effects measured. While not possessing the requisite attributes to provide a framework, the theory does provide a lens on human activity that may be utilised to mitigate the destruction of value. The Theory of Planned Behaviour is subsequently expected to address numbers one, two and four of the research questions (refer to Table 2.4).

2.5.3 Technology Acceptance Model

Whereas Yousafzai *et al*. (2007a) observe that "user acceptance of Information Technology remains a complex, elusive, yet extremely important phenomenon", (Chuttur, 2009) emphatically states that an understanding of TAM, its assumptions, limitations and strengths, is essential for researchers who have an interest in understanding the phenomenon of user acceptance of technology. TAM was expanded and customised by Davis (1989) with the intent to explain and predict user behaviour within the context of user acceptance of IS. Davis *et al*. (1989) cited, as particularly helpful, Theory of Reasoned Action's capacity to mediate between external, both controllable and uncontrollable, variables (e.g. system design characteristic, user characteristics, task characteristics, nature of development/ implementation process, political influences and organisational structure) and user behaviour, by capturing the internal psychological variables through which the listed external variables achieve influence on user acceptance. While Venkatesh (1999) highlights some hypothetical differences between Theory of Reasoned Action, the Theory of Planned Behaviour and TAM, Venkatesh & Davis (2000) describe TAM as comparing favourably with both the Theory of Reasoned Action and the Theory of Planned Behaviour. It must be noted that TAM assumes that the HCI environment within which IS use takes place, is voluntary.

In developing the model, Chuttur (2009) identified two specific changes that Davis (1989) made to the Theory of Reasoned Action. Firstly, he did not consider subjective norm in his predictive model of user behaviour, rather focusing on the psychometrically stronger and theoretically sounder construct of attitude. Subjective norm was subsequently incorporated into TAM2. Secondly, Davis (1989) identified only two key beliefs, namely perceived usefulness and perceived ease of use, from a number of important, yet irrelevant beliefs. After showing that an accumulated body of knowledge regarding self-efficacy, contingent decision behaviour and adoption of innovations provided theoretical support for perceived usefulness and perceived ease of use, Davis (1989) concluded that these constructs were fundamental and distinct in influencing the use of IS. TAM constructs (Figure 2.7) are defined as follows:

External Variables: The factors that might influence an individual's beliefs towards a system, including all the system design features, i.e. system characteristics, user training, user participation in design, and the nature of the implementation process (Venkatesh & Davis, 1996). Within this context Mathieson (1991) cautions that "A positive evaluation of an IS may be a necessary but not always sufficient condition for system use". (p173)

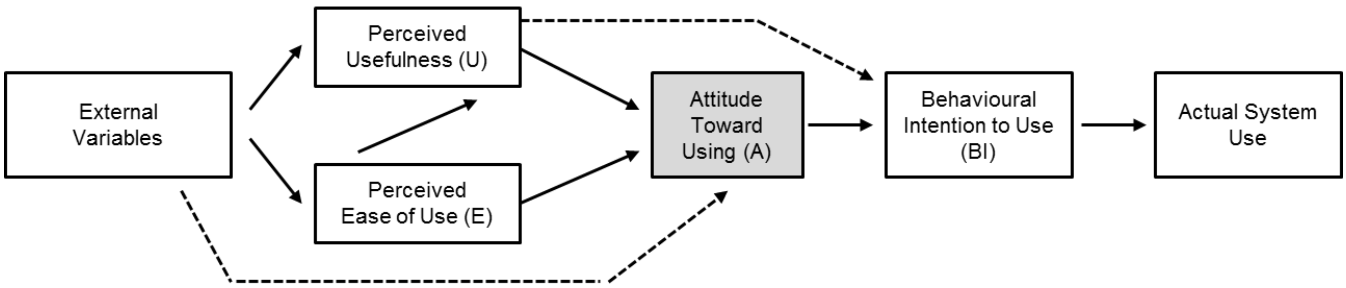


FIGURE 2.7 ORIGINAL TECHNOLOGY ACCEPTANCE MODEL (DAVIS *ET AL*., 1989)

The remaining constructs within TAM are defined as follows:

Perceived usefulness (U): The degree to which an individual subjectively believes that using a particular system would enhance his or his job performance. This subjective perception will seem rational to the user as long as his resulting actions do not conflict with his standards of value (Ulrich, 1988). Perceived usefulness has consistently been shown to strongly influence end-users' intentions to use a referent system. In addition to the obvious need for technology utilisation, the predictive Task-Technology Fit model, developed by Goodhue & Thompson (1995), maintains the requirement for alignment between the characteristics of the task to be performed and the technology utilised, to ensure positive user job performance. Davis (1989) links on to this idea by suggesting that users will firstly adopt an IS based on its functionality and, secondly, based on the simplicity with which they can manipulate the system to perform a specific function.

Perceived ease of use (E): The degree to which an individual believes that by using a particular system he would be free of physical and mental effort. With the development of the model Davis (1989) recognised that perceived ease of use has an antecedent influence on usefulness, i.e. systems that are perceived by users to be user-friendly will contribute toward performance and will consequently create a corresponding perception of usefulness. However, in Davis *et al*. (1989) it was shown that this “small but significant effect” subsides over time.

Attitude Toward Using (A): An individual's positive or negative feelings about performing a particular behaviour, e.g. using an IS. Since both (U) and (E) were found to have a direct influence on (BI), (A) was considered superfluous and later on eliminated from the model. Further, the removal of the (A) construct eliminated any unexplained direct influence from the external variables on the attitude variable (Chuttur, 2009).

Behavioural Intention to Use (BI): The degree to which a person has formulated conscious plans to perform or not perform some specified future behaviour. Although not included in the initial model, the (BI) construct was added early on by Davis *et al*. (1989) and it was shown to be directly influenced by the (U) in the model. They justified this addition by stating that users may, in some cases where a system was perceived to be useful, form a strong behavioural intention to use the system without forming any positive or negative attitude towards the system. The final version of TAM is shown in Figure 2.8.

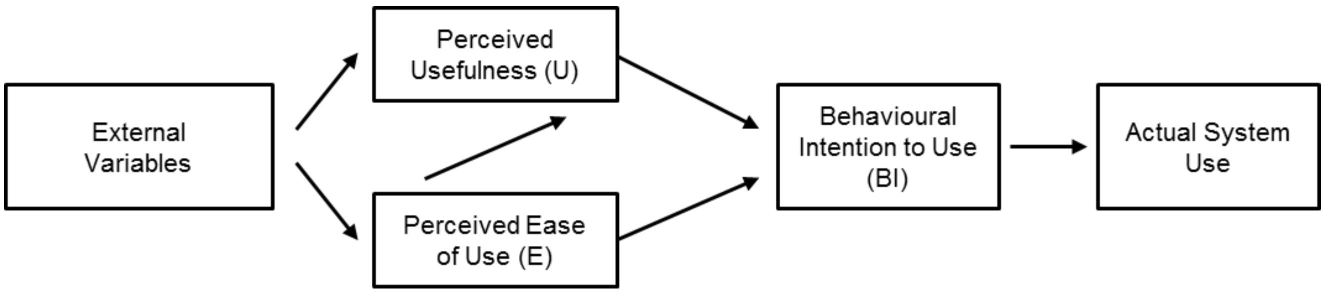


FIGURE 2.8 TECHNOLOGY ACCEPTANCE MODEL (VENKATESH, 1999)

Before proceeding on to the expansion of TAM, it must be noted that the Theory of Reasoned Action and TAM differ on a number of theoretical aspects of which two are pointedly highlighted by Davis *et al*. (1989). While both models agree that Attitude Toward Using (A) is determined by the user’s relevant beliefs, they differ in the manner that the determinants of (A) are modelled. Firstly, since the Theory of Reasoned Action is a generic model salient beliefs need to be elicited consistent with each specific new context, and may subsequently not be generalised outside of the particular context. In contrast, the (U) and (E) of TAM are assumed *a priory* and are intended to be generic determinants of user acceptance. Secondly, the Theory of Reasoned Action moves from a position where the sum of all beliefs multiplied by their corresponding evaluation weights ($\Sigma\ b_i\ e_i$) are confined within a single construct. Conversely to this, (U) and (E) are delimited as two fundamental and distinct constructs. Important diagnostic information may be gleaned since the two constructs are modelled in a disaggregate manner, each providing specific information on how (A) is influenced by the particular belief.

Over time, empirical studies have both established the validity of TAM as a predictive model, and identified the need for a number of augmentations to the constructs. Research included testing the propositions and limitations of TAM, comparing TAM with, among other things, the Theory of Reasoned Action and the Theory of Planned Behaviour, and adapting TAM to different settings, e.g. mandatory use scenarios and, lastly, extending the model to include additional constructs, including subjective norm, etc. (Chuttur, 2009). Notable enhancements to TAM are outlined in the next two sections.

Before moving on to the expansion of TAM it is prudent to evaluate a number of key criticisms levelled particularly against TAM and, to a lesser extent, extended models of TAM.

2.5.4 Criticisms against the Technology Acceptance Model

While there have been some minor concerns relating to the predictive ability of TAM (Straub, Limayem, & Karahanna-Evaristo, 1995) or its inability to influence or provide system designers with necessary information to create enhanced user acceptance for new systems (Hackbarth *et al*., 2003; Mathieson, 1991; Taylor & Todd, 1995), the concerns of most TAM critics lie elsewhere. Chuttur (2009) notes that criticisms against TAM typically fall into three categories: Firstly, the methodology used for testing TAM model, secondly, the variables and relationships that exist within TAM model, and lastly, the core theoretical foundation underlying TAM model. Each of these criticisms is briefly discussed below.

Methodology limitations: TAM is criticised by a number of researchers for the use of self-reported use data as opposed to real actual use data, which is purported to be unreliable in the measurement of actual system use (Legris, Ingham, & Collerette, 2003; Yousafzai *et al*., 2007a). In addition, wide criticism is directed toward the prolific use of students as participants in controlled environments limiting the generalizability properties of the model's empirical results (Lee *et al*., 2003; Yousafzai *et al*., 2007a). Specifically the motivations of students are drawn into question as they are deemed to be motivated by factors such as good grades, rewards etc. (Lee *et al*., 2003; Legris *et al*., 2003; Yousafzai *et al*., 2007a). Also, Yousafzai, Foxall, & Pallister (2007b) note the methodological limitation of using covariance-based statistical approaches in detecting causal directions, which they believe to be unclear between certain causal factors in TAM.

Variable and relationship limitations: Firstly, as noted previously, the vast majority of studies employ TAM to explain and predict the voluntary use of a system, with only a limited number of studies considering mandatory use environments (Yousafzai *et al*., 2007a). The noted limitation is pertinent if one considers that the use of organisational IS is generally mandatory (Lee *et al*., 2003; Yousafzai *et al*., 2007a). A field study conducted by Brown, Massey, Montoya-Weiss, & Burkman (2002) within a banking environment, concluded that for system acceptance, perceived usefulness did not have the same importance as perceived ease of use within a mandatory setting of system use. This contrasts directly with the original proposal by Davis (1989) that perceived usefulness was purported to have prominence over perceived ease of use, within a voluntary setting. Next, in a study carried out by Yang & Yoo (2003) they tested two attitudinal variables namely ***affective*** and ***cognitive***, showing cognitive attitude to be highly significant. They subsequently proposed the reconsideration for the inclusion of attitude in TAM. Also, a study conducted by Burton-Jones & Hubona (2006), within a United States Government agency, showed that the two constructs of perceived usefulness and perceived ease of use, may not prove to be mediatory on all external environmental factors impacting on system usage. They concluded that external factors such as age, system experience and level of education may prove to have a direct influence on system use. Moreover, Yousafzai *et al*. (2007a) note that TAM does not sufficiently explain the user's task environment or the technology's suitability for the performance of a particular task. The reader is referred to the section in this document discussing Task-Technology Fit. Finally, Hess, Mcnab, & Basoglu (2014) call for a holistic evaluation of TAM construct validity, arguing that TAM study characteristics may to some extend reduce scale validity and within certain contexts render a scale inapt.

Theoretical foundation limitations: Critique presented by Benbasat & Barki (2007) state that while TAM provides a potentially useful bridge to antecedents and consequences of IS adoption, this bridge is perceived to have become an end in itself, ignoring both the design and implementation base antecedents as well as behaviour and performance based consequences of IT adoption and acceptance. Next, a number of poor theoretical relationships between constructs were noted by Bagozzi (2007). He particularly questioned the strength of the linkage between (BI) and the Actual System Use construct, by observing that behaviour could not be considered as a terminal goal, but that it should rather be treated as a means to a more fundamental goal. Furthermore, he argues that the time lag that naturally occurs between intention and actual use is filled with uncertainty and unforeseen factors that necessarily influence an individual's decision to adopt a technology. As noted by Gaibraith (1973) uncertainty will increase the amount of information that must be processed during the execution of a task. He subsequently concludes that intention may not provide an accurate indication of actual use. A third issue highlighted by Bagozzi relates to his scepticism regarding the summation of measures for (U) and (E), since differential contributions of salient beliefs may exist. Moreover, he argued that processing of salient beliefs within TAM did not necessarily correspond to the actual workings of human memory operation. Finally, Bagozzi (2007) maintains that TAM cannot be reliably applied for predicting system use since it was a deterministic model that did not consider an individual's capacity for evaluation and self-reflection on his intention, which may direct the individual to reformulate his intention, and hence originally decided course of action.

The forgoing and other criticisms have prompted one author (Chuttur, 2009) to conclude that research on TAM may have reached its level of saturation and that future research should focus on the development of new models that exploit the strengths of TAM while discounting its apparent weaknesses. TAM2, TAM3 and the Unified Theory of

Acceptance and Use of Technology have to some extent succeeded in realising this idea. Notable enhancements to TAM are outlined in the next two sections.

2.5.5 Modified Technology Acceptance Model (TAM2 & TAM3)

TAM has been continually studied and expanded by a number of researches in an effort to address some of the criticisms raised, not least of all Venkatesh & Davis (2000) and Venkatesh *et al*. (2003) and Venkatesh, (2000). Assessing their model, (Venkatesh & Davis, 2000) realised that TAM was limited in its ability to explain why a user would perceive a particular system as useful or not. They subsequently proposed the addition of a number of antecedents (including subjective norm from the Theory of Planned Behaviour) to the perceived usefulness construct, which resulted in TAM2. Since TAM was limited to voluntary conditions of use, TAM2 incorporated a component of voluntariness. Within workplace settings where users lack complete volition over their behaviour, Bhattacherjee & Premkumar (2004) have noted that user cognition is easier changed than behaviour. Stated differently, as users gain more experience with a particular mandatory system, they evaluate the extent to which their initial cognition of the system is consonant or dissonant with their actual present experience, and will subsequently be more prone to revise their cognition to achieve greater cognisance, than their behaviour.

The theoretical constructs were considered within two process categories namely social influence processes (voluntariness, subjective norm and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability and perceived ease of use). A longitudinal study of four different systems at four organisations (N=156), two involving mandatory and two voluntary usage, was conducted on by (Venkatesh & Davis, 2000) to demonstrate the predictive capabilities of TAM2.

The extended model proved to be valuable in its ability to provide more detailed explanations as to why users would perceive a referent system to be useful. The empirical results of TAM2 verified the momentous impact of both the social influence and cognitive instrumental process groups on user acceptance. Moreover, the results showed that TAM2 was useful in both voluntary system usage and mandatory system usage environments; with the exception that subjective norm had an effect only within the latter scenario.

Detailed explanations of the additional variables and determinants for TAM2 and TAM3 are provided in the 'Definitions of Key Terms' section. The extension to TAM2 with the addition of the *Anchor* and *Adjustment* construct groups as antecedents to (E), culminated in TAM3 model, as shown in Figure 2.9.

A second noteworthy move to extend TAM was unilaterally embarked on by Venkatesh (2000) in an effort to identify the antecedents to the perceived ease of use construct. Venkatesh (2000) applied determinants to TAM, previously identified in studies conducted by himself and Davis (Venkatesh & Davis, 1996) and (Davis, Bagozzi, & Warshaw, 1992), that proved to be antecedents to perceived ease of use. These antecedents were categorised into two main groups, namely anchors (to determine early perceptions of ease of use) and adjustments (to determine adjusted perceptions of ease of use). A longitudinal study of three different systems at three organisations (N=246), all three allowing for voluntary usage, was conducted by Venkatesh (2000) to demonstrate the predictive ability of TAM3.

Similarly to TAM2, the results obtained from TAM3 provided strong evidence for the predictive ability of the determinants in explaining perceived ease of use. The study found that internal control (computer self-efficacy), external control (facilitating conditions), emotion (computer anxiety), and intrinsic motivation (computer playfulness) serve as anchors employed by users when forming perceptions *vis-à-vis* the ease of use of a new system. With an increase in user experience with the referent systems, the adjustments that proved to be significant included perceived enjoyment, objective usability and perceptions of external control within the context of the specific system environment. The study further confirmed that perceived ease of use had a direct and indirect (via perceived usefulness), effect on behavioural intention. An interesting observation from the findings suggested that, contrary to conventional attitude-intention theories, long-term perceived ease of use of a particular system is strongly anchored to an individual's *a priory* beliefs about computers in general. Finally, Venkatesh (2000) highlighted a divergence from the Theory of Planned Behaviour, showing that a direct causal effect relationship did not exist between external control and intention.

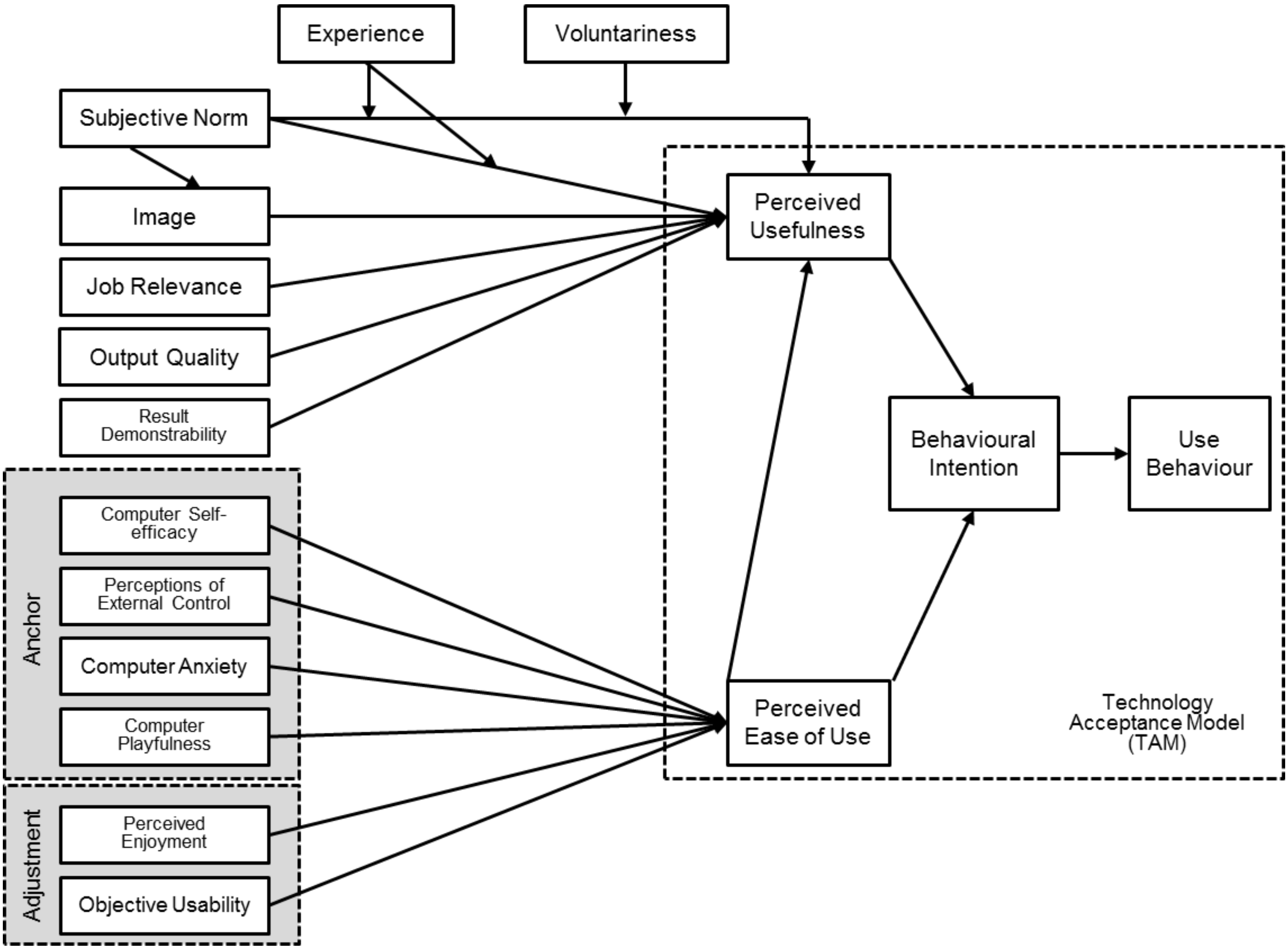


FIGURE 2.9 MODIFIED TECHNOLOGY ACCEPTANCE MODEL (VENKATESH, 2000; VENKATESH & DAVIS, 2000)

2.5.6 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) (see Figure 2.10), proposed by Venkatesh *et al*. (2003) in an attempt to provide a synthesis within the field of user acceptance of technology, was developed by integrating elements across eight competing IS acceptance research models. UTAUT considered the following models: The Theory of Reasoned Action by Fishbein & Ajzen (1975), the Theory of Planned Behaviour (Ajzen, 1991), TAM (Davis, 1989), a combined model of the Theory of Planned Behaviour & TAM (Taylor & Todd, 1995), the Motivational Model (MM) (Davis *et al*., 1992), the Model of Personal Computer Utilisation (Thompson, Higgins, & Howell, 1991), Innovation Diffusion Theory (Moore & Benbasat, 1991), and Social Cognitive Theory (Compeau & Higgins, 1995).

In contrast to the eight extant models of user acceptance, where intention and/or usage is employed as the key dependant variables, the intention of UTAUT is to position usage as a dependant variable, with intention as a predictor of behaviour. The UTAUT, formulated with four core determinants of intention and usage, and up to four moderators of key relationships (Venkatesh *et al*., 2003) was found to outperform each of the eight contributing models, explaining up to 70 percent of the variance in intention.

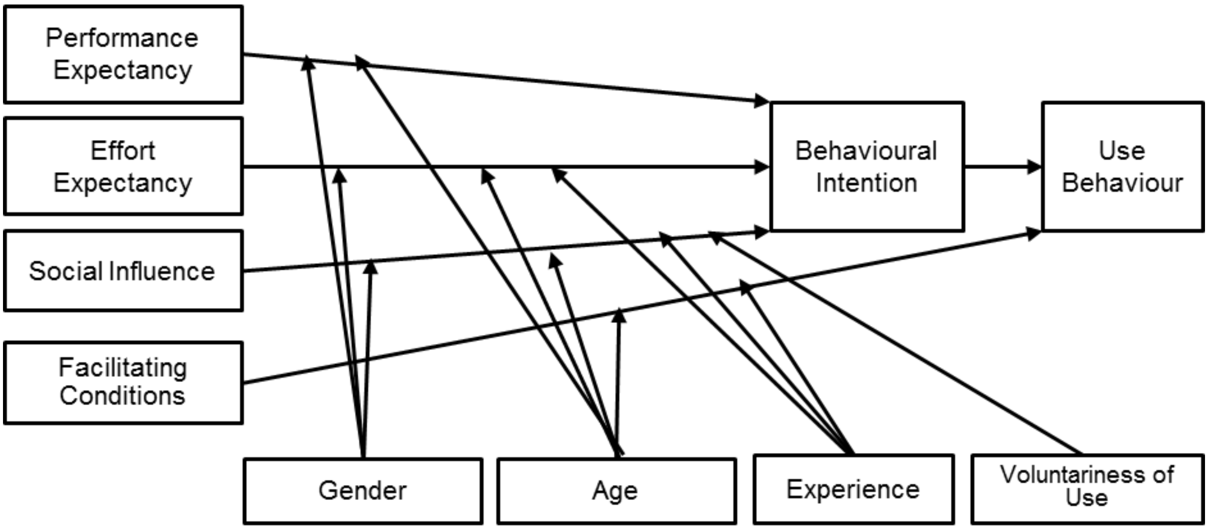


FIGURE 2.10 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (VENKATESH *ET AL*., 2003)

The four core determinants contained within UTAUT comprise performance expectancy, effort expectancy, social influence and facilitating conditions, while the four key moderating variables include experience, voluntariness, gender and age. Since the purpose of this study is centred on the individual interactions of humans with IS, the critique against UTAUT from Burton-Jones & Gallivan (2007) that it is not a multi-level theory, is irrelevant. This is not to suggest that a multi-level theory approach, where constructs are conceptualised not only on the individual level but also on group and organisational levels, may not be valuable to this study, but simply that an in-depth consideration of multi-level theory may potentially expand the scope of this study to an unattainable level. As Reynolds (2008) fittingly observes, no framework or system can be entirely holistic or appropriately conversant with all relevant perspectives impacting on the phenomenon under study.

2.5.7 Application of the Technology Acceptance Model

In the recent past TAM in its various forms has been successfully applied within several environments, e.g. e-banking (Makarević, Secim, & Toycan, 2014; Mehmood, Shah, Azhar, & Rasheed, 2014; Salimon, Zien, & Abdullateef, 2014), e-commerce (Jiang, Wang, Ye, & Su, 2014; Pantano & Migliarese, 2014; Saricam, 2014; Yen, 2014; Yi Jin, Bin Osman, & Suberi Bin AB.Halim, 2014), education (Kear, Donelan, & Williams, 2014; Malinovski, Vasileva, Vasileva-Stojanovska, & Trajkovik, 2014; Smeda, Shiratuddin, & Wong, 2014; Tsai & Chang, 2014; Yeboah, Ansong, Aboagye, Antwi, & Yiranbon, 2014), gender specific adoption of technology (Bilal & Jopeck, 2014; Goh & Sun, 2014; Zhang, Nyheim, & Mattila, 2014), etc.

From the foregoing discussions on TAM, TAM2, TAM3 and UTAUT, it is evident that the literature on these models support instances where the introduction of technological solutions may not provide the expected positive outcome when utilised by humans. Moreover, the literature on TAM, TAM2, TAM3 and UTAUT provide for models within which the value dissipating effects on organisations may be contextualised or the unintentional value destroying causes and effects measured. These models may also be utilised as lenses to understand human activities employed to mitigate the destruction of value. TAM is subsequently expected to address all four of the of the research questions (refer to Table 2.4).

2.5.8 Post Unified Theory of Acceptance and Use of Technology

A number of studies have been conducted in response to the theories and constructs developed within the Theory of Reasoned Action, the Theory of Planned Behaviour, TAM, TAM2, TAM3 and UTAUT as described below:

<u>Two-Stage Theoretical Model of Cognition Change</u>: A noteworthy contribution was made by Bhattacherjee & Premkumar (2004) with the development of their two-staged model of cognition change shown in Figure 2.11. They state that their model is developed with the intention to study “the process by which user beliefs (expectations)

or attitude regarding IT usage, change over time from the pre-usage stage to usage stage or the role of emergent constructs in driving that change.”

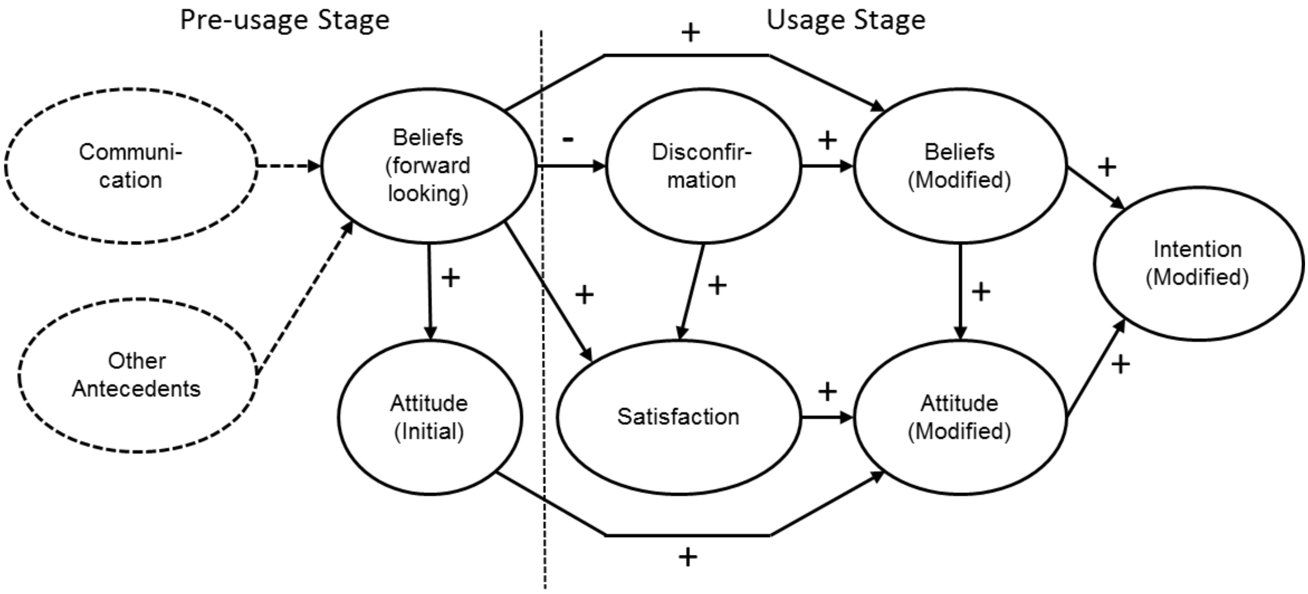


FIGURE 2.11 TWO-STAGE THEORETICAL MODEL OF COGNITION CHANGE (BHATTACHERJEE & PREMKUMAR, 2004)

Within the context of the model Bhattacherjee & Premkumar (2004) define cognition as “one’s beliefs, affect, opinion, values, and knowledge about one’s environment, while behaviour refers to actions initiated in response to this cognition and/or personal evaluation of that behaviour.” They further note that cognition reaches steady-state equilibrium over time as users become more realistic and entrenched in observed behaviours. The model draws from Expectation-Disconfirmation Theory (Oliver, 1980). Disconfirmation (a belief) and satisfaction (an affect) are two emergent constructs in Expectation-Disconfirmation Theory hypothesized to change subsequent user behaviour.

The beliefs construct in the model corresponds to that of the perceived usefulness construct (U) in TAM and, alongside attitude (A), was added due to their salience in TAM literature as predominant predictors of IT usage intention including their stable impact on the dependent variable over time (Davis, 1989). Antecedents to pre-usage beliefs (Beliefs – forward-looking) comprise externally communicated information (e.g., available IT features) and other factors (e.g., personal innovativeness).

Moving from the premise that new cognitions tend to remain within the locus of prior cognitions, accordingly adjusted to new positive or negative stimuli, Bhattacherjee & Premkumar (2004) postulates that future stage cognitions may be viewed as the sum of an additive function of prior cognitions, plus counting any deviations or discrepancies from those levels based on actual experience. Hence the delineation in the model of usage-stage belief (Beliefs – Modified) as the combined outcome of pre-usage belief (Beliefs – Forward-looking) and Disconfirmation. Similarly, usage-stage attitudes (Attitude – Modified) are described as being determined by both pre-usage attitude (Attitude – Initial) and Satisfaction.

The study concludes by highlighting the importance of emergent factors such as disconfirmation and satisfaction as critical to understanding changes in IS users' beliefs and attitudes and recommends that these factors be incorporated in future process models of IT usage. Of interest in the results of the research is the finding that the magnitude of usefulness and attitude change for negatively disconfirmed or dissatisfied subjects was substantially larger than that of positively disconfirmed or satisfied users. The conclusion is then that users react more strongly to negative than positive experiences, and accordingly the effects of emergent factors on subsequent cognitions are asymmetrical. These finding correspond to research conducted one year earlier by Hackbarth *et al*. (2003) who found that while both positive (computer playfulness) and negative (computer anxiety) experiences proved significant mediators of the effect that system experience has on ease of use, the effect was fully mediated by only computer anxiety.

<u>Integrated User Satisfaction and Technology Acceptance Model</u>: Whereas Davis *et al*. (1989) criticises user satisfaction research for its limited ability to predict system usage, Orlikowski & Iacono (2001) slate past TAM studies for their inability to account for temporal and contextual variations in the patterns discerned. Wixom & Todd (2005) boldly defends the need for understanding the equivocal relationship between the user satisfaction and usage literature. Moreover, they acknowledge that a belief or attitude can only be directly predictive of behaviour if it adheres to the rudiments of consistency in terms of time, target and context, recognising satisfaction with a system and its information output to not be directly predictive of the use of that system. They further

recognise the technology acceptance and user satisfaction literature steams to be complementary steps in a causal chain explicating the progress from system design characteristics, to user beliefs and expectations about outcomes that ultimately determine system usage.

Wixom & Todd (2005) proposed to breach the satisfaction-usage gap by constructing a theoretical bridge from IS design and implementation decisions to system characteristics to the prediction of usage. They identified user-satisfaction and technology acceptance as the key themes that drive understanding of IT usage and subsequently proposed the integration of these research streams in an effort to augment understanding of the manner in which an IS's features ultimately affect system usage. The model makes explicit the distinction between beliefs and attitudes, found in respectively the user satisfaction (object-based) and technology acceptance (behavioural) literature, as delineated in Figure 2.12.

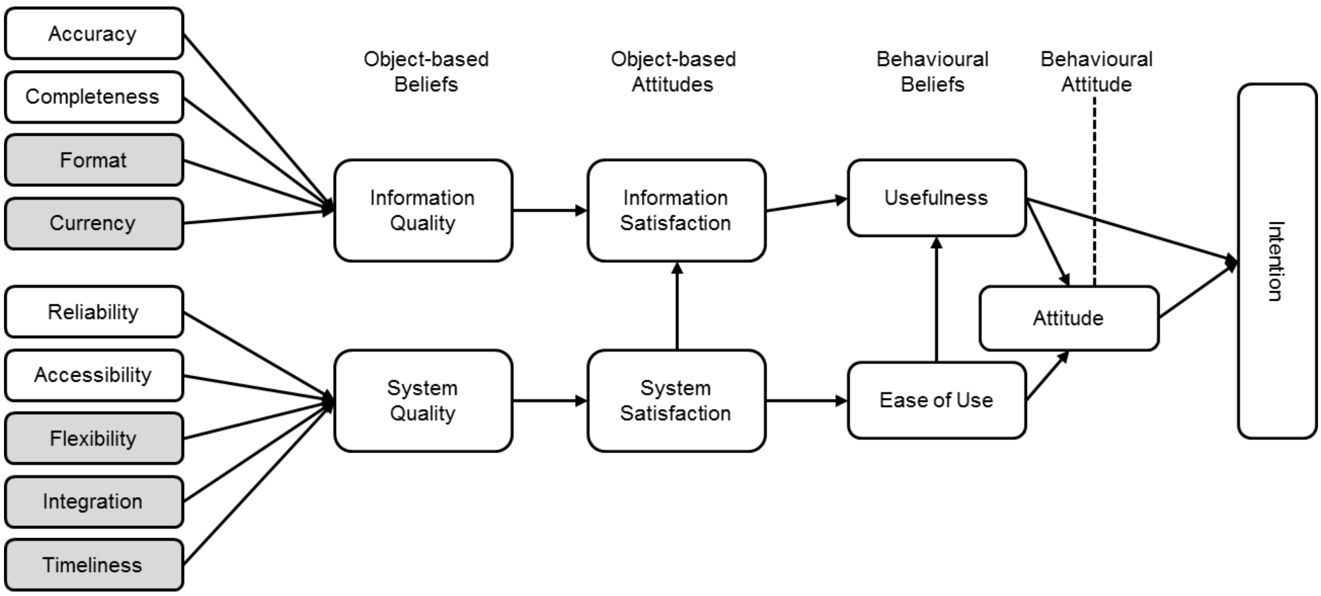


FIGURE 2.12 WIXOM & TODD RESEARCH MODEL (WIXOM & TODD, 2005)

Progressing from left to right, the model enumerates a set of information and system characteristics that are purported to respectively influence information quality (accuracy, completeness, format and currency) and system quality (reliability, accessibility, flexibility, integration and timeliness). Continuing, the information and system characteristics in turn influence object-based beliefs and attitudes, with the information and the system that produces it. Finally, the model describes the influence that object-based attitudes have in the shaping of behavioural beliefs of usefulness and ease of use, and ultimately system usage. In contrast to technology acceptance literature, the literature on user satisfaction has focused on the elements of information and system characteristics (DeLone & McLean, 1992). Since user satisfaction is viewed within this literature as the attitude that a user has toward an IS, it can be said to represent an object-based attitude (Wixom & Todd, 2005). Moreover they suggest that system satisfaction has a direct influence on information satisfaction since a user's effective interaction with a system is a necessary condition for obtaining useful information from it. Research results show a strong significant relationship between respectively information satisfaction and usefulness, and between system satisfaction and ease of use. The results support the applicability, as postulated by Wixom & Todd (2005), of information and system satisfaction as external variables to TAM beliefs of usage behaviour.

In closing it is worth noting that the format and currency antecedents to information quality and the flexibility, integration and timeliness precursors to system quality, presented particularly weak relationships.

2.5.9 Mapping of Theories to Research Questions

Table 2.4 provides a presentation of the theories that were investigated during the literature study and demonstrates the coverage of each theory compared to the research questions. From the table it is evident that while some theories provided stronger support to the study of questions related to human behaviour, others in turn provided grounding for the conceptual Theoretical Technology Value Framework.

This review has shown that the productivity paradox is fundamentally informed by the actions and behaviours of individuals and groups within an organisational context. In support, a number of germane theories were introduced which moved from the Cultural Context within which an individual finds himself and provided perspectives around the research problem by pausing in turn at the Lazy User Theory,

TABLE 2.4 THEORETICAL COVERAGE OF RESEARCH QUESTIONS (AUTHOR)

Theory/Model	Rationale	Research Quest.			
		1	2	3	4
Productivity Paradox	The selected questions address and seek to model the phenomenon in the productivity paradox where IT investments do not provide the expected business value.	X			X
Lazy User Theory	The selected questions touch on the theory that individuals will prefer easy, as opposed to optimal methods, to perform tasks.	X	X		X
Technology-to-Performance Chain	The selected questions refer to the need for technology to be customised towards the tasks to be performed.	X	X		X
Agency Theory	The selected questions seek to investigate an employee's behaviour of self-advancement at the cost of the advancement of the organisation.	X	X		X
Theory of Reasoned Action	The selected questions enquire into human intentionality that drives behaviour.	X	X		X
Theory of Planned Behaviour		X	X		X
Technology Acceptance Model	The selected questions highlight the need for a predictive model to be developed that can be applied as a lens to detect or predict, analyse and moderate value eroding elements, as a direct result of HCI, within technology driven organisations.	X	X	X	X
Technology Acceptance Model 2		X	X	X	X
Technology Acceptance Model 3		X	X	X	X
Unified Theory of Acceptance and Use of Technology		X	X	X	X

2.6 SUMMARY OF LITERATURE REVIEW

The discussion moved from the Technology to Performance Chain, Agency Theory, the Theory of Reasoned Action, the Theory of Planned Behaviour, and concluded with the Technology Acceptance Model. While confidence is placed on the foregoing theories, Flood (2010) cautions that individuals harbour intentions that lie behind each action that they perform, and that neither observation nor theory can fully provide certainty in understanding what those intentions are. This chapter concludes with the development of a conceptual Theoretical Technology Value Framework, which is the subject of the next section.

2.7 Towards a Theoretical Technology Value Framework

Gregor (2006) defines theories as:

> "Abstract entities that aim to describe, explain, and enhance understanding of the world and, in some cases, to provide predictions of what will happen in the future and to give a basis for intervention and action." (p616)

She further proposes that IS research theories may be classified within five categories as presented in Table 2.5. Gregor (2002) does however caution that the distinction between the categories is not clear-cut. The two frameworks, namely Activity Theory and Critical Systems Heuristics, that will presently be explained and combined within this thesis, are subject to their distinguishing characteristics, both categorised as Type-II theories. On the other hand, TAM, as a predictive model is accepted to align to Type-III theories.

Table 2.5 Taxonomy of Theory Types in IS Research (Gregor, 2006)

Theory Type	Distinguishing Attributes
I. Analysis	Says what is. The theory does not extend beyond analysis and description. No causal relationships among phenomena are specified and no predictions are made.
II. *Explanation*	*Says what is, how, why, when, and where. The theory provides explanations but does not aim to predict with any precision. There are no testable propositions.*
III. *Prediction*	*Says what is and what will be. The theory provides predictions and has testable propositions but does not have well-developed justificatory causal explanations.*
IV. Explanation and Prediction (EP)	Says what is, how, why, when, where, and what will be. Provides predictions and have both testable propositions and causal explanations.
V. Design and Action	Says how to do something. The theory gives explicit prescriptions (e.g., methods, techniques, principles of form and function) for constructing an artefact.

By combining a predictive model with an explanatory methodology, this research covers both an explanatory description of the phenomenon under investigation and a causal explanation of why the phenomenon exists. This is covered in the Type-IV of theories. It is within this *Explanation and Prediction* theory type that the proposed Theoretical Technology Value Framework finds sanctuary.

A theoretical framework is proposed to ensure the measurability of the main purpose of the study (set out in the problem statement) as required by Gackowski (2012), who also notes that this will further ensure tangible replicable research findings. The development of a Theoretical Technology Value Framework[2] serves a dual purpose, as described by Flood (2010), who notes that models are “employed as research tools to describe or explain a social phenomenon or as decision making tools that predict events and suggest actions to take today to achieve improvement some time later.” In addition, Checkland (1995) observe that: “every model of a notional purposeful whole, if it is to be coherent, will have to be built according to a declared world-view or *Weltanschauung,”* furthermore Reynolds (2005) points out that the distinguishing criteria of human social systems are driven by the generation of change or not, within a particular world-view providing collective meaning. Most of the elements comprising the framework are not novel, but simply build on work by previous authors who are recognised in the foregoing sections. What is claimed as novel, however, is the repositioning and emphasis of these elements, and the inclusion of a number of novel constructs, ensuring a framework that is fit for purpose.

The proposed framework will, in harmony with the perspective that Soh & Markus (1995) offers, enclose a cause and effect argument of the “necessary but not sufficient” form, characteristic of process theories. Firstly, the framework (Figure 2.13) will endeavour to delimit and explicate the phenomenon where the adoption and use of an IS in an organisation, as an explicit value generator, also inadvertently brings about the destruction of business value. Secondly, the framework will serve as a precursor to a predictive model, akin to TAM, that will attempt to identify the antecedents that influence both quiescent and recalcitrant behaviour in users of IS.

[2] For purposes of consistency in this document a model is defined as a framework that has been empirically validated with test data.

Within the context of systems thinking, Jackson (2003) recognises that the structure of a system is constituted by the systemic interrelationships between feedback loops, concluding that the structure constitute the primary driver for a system's behaviour. When considering feedback loops it serves well to note that changes in each variable, to some extent, causes changes in the other variables (Levins, 1998). Moreover, Flood (2010) and Mingers & White (2009) identify two forms of feedback that need to be incorporated when constructing a model, namely negative feedback with balancing loops, leading to stability; and positive or reinforcing feedback with amplifying loops, that lead to continual growth or decay.

Within the conceptual Theoretical Technology Value Framework, two feedback loops are proposed, namely D*egree of Control* and D*egree of Influence*. The degree of control loop attempts to control both quiescent and recalcitrant user behaviour during system usage, while the degree of influence loop endeavours to influence user belief, attitude, and intention, towards correct and optimal system use. Also, endogenous variables of system and management control are recognised as existing within the ambit of organisational command. In contrast, a myriad of exogenous variables are accepted to impact on behavioural beliefs, attitudes and the intention of users, which cannot be controlled by the organisation, but at best, partially influenced.

Neumann (2013) advises that, regardless of the tool being used, it is of key import to include relevant decisive factors into the model and to contemplate the salient relations that exist between factors. Within the organisational sphere Anitesh Barua *et al*. (1995) propose the locus of the primary impact of technology to be at operational level. This statement is broadly supported by Donovan *et al*. (1997) who suggest that the value factors of an organisation are not determined at senior executive level but rather reside at grassroots level, deep within the operational processes of the organisation. The corollary of these propositions logically places the level of measurement at the contact point between the IS and the user. They continue by noting that these effects, at an elementary level, may accordingly be traced within a chain of relationships throughout the organisational hierarchy in an effort to reveal higher order impacts, culminating in organisational performance.

Following on from the Wixom & Todd Research Model and incorporating TAM, which ties constructs from the user satisfaction and technology acceptance literature into a single research model (Wixom & Todd, 2005), it is subsequently adapted and incorporated into the development of the Theoretical Technology Value Framework. Moreover, since its creators assert that their model exhibits diagnostic value throughout any stage of a system's implementation or usage process, it is deemed suitable for this study. From an ontological position it is recognised that the proposed theoretical framework exists separate from the subjective understanding of the author or any research participants.

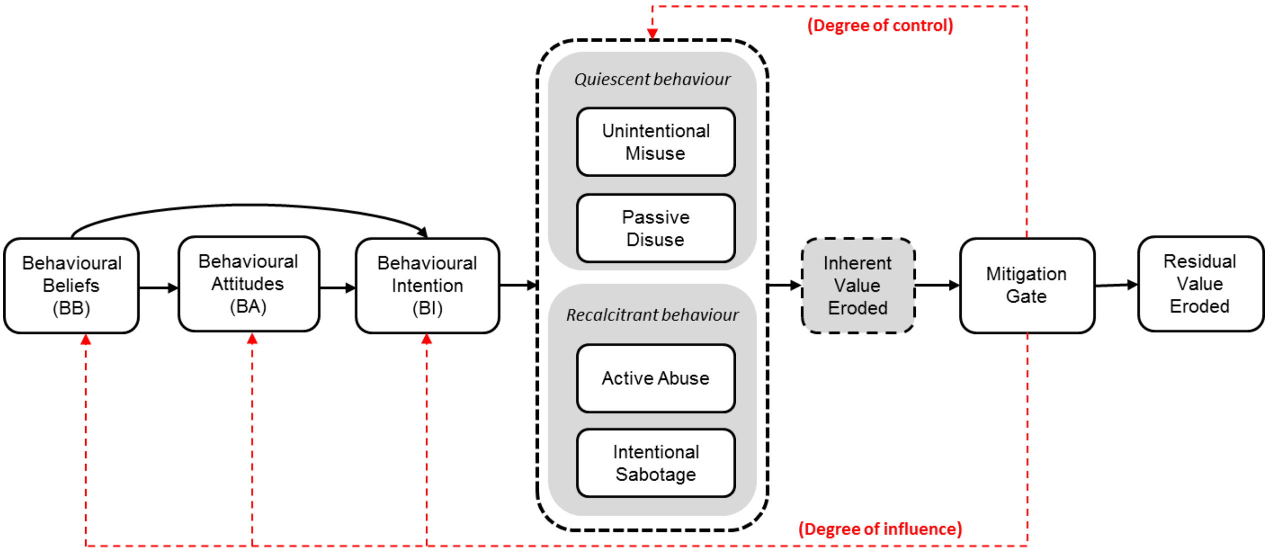


FIGURE 2.13 THEORETICAL TECHNOLOGY VALUE FRAMEWORK (AUTHOR)

Moving from left to right, the framework constructs are described as follows: Behavioural beliefs, behavioural attitude and behavioural intention will be applied as in the Wixom & Todd Research Model delimitated in Figure 2.12. Moreover, these constructs are defined in TAM, which provides an understanding of the phenomenon of user acceptance of technology. Similarly TAM2 and TAM3 provided strong evidence for the predictive ability of the determinants in explaining behavioural beliefs. The particular antecedents within these constructs, that give rise to quiescent and/or recalcitrant behaviour, will be articulated in the next chapter and tested in Chapters four and five.

Next, unintentional misuse and passive disuse are both assumed to possess quiescent qualities. The unintentional misuse construct denotes actual behaviour where the user is misapplying the system, either consciously or unconsciously, due to a lack of skill or negligence. Elements of both the lazy user theory and the Technology-to-Performance Chain are understood to possess elements of quiescent behaviour. Technology-to-performance chain asserts that in order for technology to have a positive impact on a user's performance, IS user utilisation is required and alignment between the characteristics of the task that the user has to perform, and the technology needs to exist. Conversely, if this alignment is not evident, the use may unintentionally misuse the system. Soh & Markus (1995) note that 'user skill' is a critical IT asset without which the value of the IT portfolio cannot be realised.

In contrast, passive disuse can be described as a user's passive-aggressive attitude towards having to use a particular system, causing the user to avoid interaction with the system. Since behavioural intention informs actual behaviour, unintentional misuse due to logical errors in system codes (Sukhoo, Barnard, Eloff, & Poll, 2004) are not considered. While a number of solutions may potentially fulfil the needs of the user, the lazy user theory holds that he will be biased towards those solutions that are perceived as most suitable and usable at a specific place and point in time. Lazy user theory moreover proposes that the user will pick an option from the selection of satisfactory solutions based on the lowest level of effort, by implication discarding high effort technology solutions.

Diverging from quiescent behaviour, the two recalcitrant value eroding behaviour constructs describe a more sinister scenario. Checkland & Howell (1998) are quick to observe that employees cannot simply be taken to be quiescent contributors to the achievement of organisational goals. They propose that a rich model has to leave room for actors who, while demonstrating subversive behaviour, still remain true members of the organisation. Active abuse encompasses situations where a user determinedly employs the system for personal gain or to perform unauthorised transactions.

Intentional sabotage designates the purposeful disruption or damage to a system by a disgruntled user. Willison & Siponen (2009) note that disgruntled users may represent insider threats within an organisation that may prove to be more harmful than external threats, as these insiders may abuse their skills and knowledge, honed through the process of legitimate work duties, for illegitimate gain. Padayachee (2014) proposes that "*inducing cognitive dissonance may be a means of mitigating the neutralisations that the insider may use to justify maleficence*". This concept was adopted in formulating questions relating to active abuse and intentional sabotage. While epiphenomenal relationships may exist between the four actual behavioural elements impacting on each other, the presence and nature of these relationships will only become explicit once the framework is converted into a model that has empirically been validated by test data.

The two recalcitrant value eroding behaviour constructs are understood within the Agency Theory where the employer faces the dilemma of endeavouring to motivate a self-interested employee to act in the best interests of the principal rather than in his own interests. Moreover, the theories of reasoned action from Fishbein & Ajzen (1975, 1980) predicting generic human behaviour, and the Theory of Planned Behaviour, which includes the construct of perceived behavioural control, propose that it is at the level of beliefs that one learns about the unique factors that prompt an individual to engage in a particular behaviour of interest while another follows a different course of action.

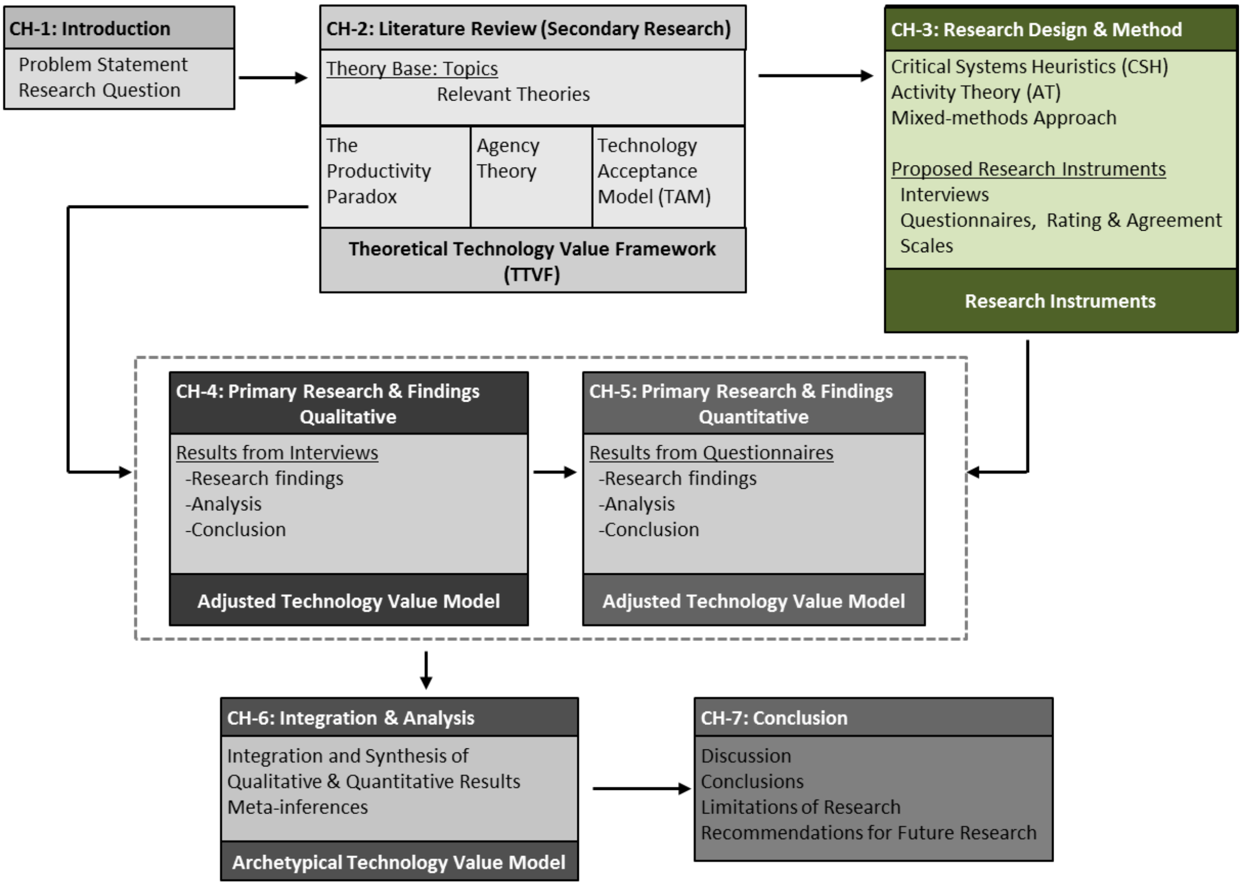
The outcomes of each of the actual value eroding behaviour constructs is summated into the residual value eroded determinate which is a precursor to the mitigation gate. The latter mediates between the inherent value eroded and the residual value eroded as it attempts to moderate undesirable actioned behaviour through system controls and human influence. The final construct of residual value eroded defines the latent value eroded (not exposed by the model), after particular measures had been taken to reduce the value erosive effects caused by system users.

Finally, it is evident from the above discussion that the elements of UTAUT (developed by integrating elements across the Theory of Reasoned Action, the Theory of Planned Behaviour, TAM, a combined model of the Theory of Planned Behaviour & TAM, the Motivational Model, the Model of Personal Computer Utilisation, Innovation Diffusion Theory, and Social Cognitive Theory), contributes to a greater or lesser degree towards an enriched understanding of each of the constructs comprising the Theoretical Technology Value Framework.

2.8 SUMMARY OF CHAPTER 2

This chapter examined various theories that provided support and insight into the primary and secondary research questions in Chapter 1. The theories developed a case for the research problem in that they demonstrated how individuals' actions are not only focused towards value increasing acts but also comprises actions that may erode or destroy organisational value. While a general investigation into the foregoing phenomenon was initially embarked on, specific focus was continually placed on the resultant value generating or eroding effects that the actions of individuals produce in their interactions with IS. Finally a conceptual Theoretical Technology Value Framework was introduced as a lens to more fully investigate the research problem. The next chapter proposes two complementary research methods that are combined and supported by various research instruments in the investigation of the problematic situation where organisational value is inadvertently eroded through the adoption and use of an IS.

CHAPTER 3



CH-1: Introduction
Problem Statement
Research Question
CH-2: Literature Review (Secondary Research)
Theory Base: Topics
Relevant Theories
The Productivity Paradox
Agency Theory
Technology Acceptance Model (TAM)
Theoretical Technology Value Framework (TTVF)
CH-3: Research Design & Method
Critical Systems Heuristics (CSH)
Activity Theory (AT)
Mixed-methods Approach
Proposed Research Instruments
Interviews
Questionnaires, Rating & Agreement Scales
Research Instruments
CH-4: Primary Research & Findings Qualitative
Results from Interviews
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-5: Primary Research & Findings Quantitative
Results from Questionnaires
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-6: Integration & Analysis
Integration and Synthesis of Qualitative & Quantitative Results
Meta-inferences
Archetypical Technology Value Model
CH-7: Conclusion
Discussion
Conclusions
Limitations of Research
Recommendations for Future Research

3. RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION TO RESEARCH METHODOLOGY

Kothari (2004) defines research methodology as the science of studying how research is performed scientifically, or more simply stated, a means to systematically solve a particular research problem. He further notes that in the research methodology one studies the various steps that are generally adopted by the researcher in studying his research problem along with the logic behind each step.

Without a well-structured research methodology the researcher will not know which research methods/techniques are relevant to the research or how to apply these. Kothari (2004) underscores the importance of the research methodology by providing the following guidance:

1. Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why.
2. Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not.
3. It is necessary for the researcher to design his methodology for his problem as the same may differ from problem to problem. For example, in research the scientist has to expose the research decisions to evaluation before they are implemented. He has to specify very clearly and precisely what decisions he selects and why he selects them so that they can be evaluated by others also.
4. Research methodology has many dimensions and research methods do constitute a part of the research methodology. The scope of research methodology is wider than that of research methods. (pp7,8)

The discussion now turns to an investigation into the two key research methods that will be followed and ultimately synthetized, as the theoretical basis for the structure, content and application of the research instruments.

The following sections outline the research approaches considered in conducting the research. Firstly, the literature around the two respective research approaches is discussed, followed by a review of the research design and research instruments employed.

3.2 QUALITATIVE RESEARCH APPROACHES

Klein & Myers (1999) hold that interpretive research can aid researchers of IS in understanding both human thought and action in social and organizational contexts, and so producing rich insights into IS phenomena. They go on to propose a set of seven principles when conducting and evaluating interpretive field research in IS, acknowledging that, while not all of the principles may apply in every situation, their systematic consideration is likely to improve the quality of future interpretive field research in IS. The principles and the considerations for this research by the author (in italics) follow:

1. **The Fundamental Principle of the Hermeneutic Circle.** This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles. *The components of the Theoretical Technology Value Framework and resulting models will be investigated both as interdependent constructs as well as subcomponents of a synergetic whole.*
2. **The Principle of Contextualization.** Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged. *The literature review provides context for the development of the Theoretical Technology Value Framework.*
3. **The Principle of Interaction between the Researchers and the Subjects.** Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants. *The researcher*

proposes to create a Theoretical Technology Value Framework from the literature. Position the framework with a diverse group of professionals within a semi-structured question and answer interview setting. Update the framework with the responses from the interviews towards an Adjusted Technology Value Model.

4. **The Principle of Abstraction and Generalization.** Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action. *The research goals, for the qualitative component, will place the focus on the individual rather than focusing on, or generalizing individual results to the entire population.*
5. **The Principle of Dialogical Reasoning.** Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision. *While the literature provided for an initial framework in the form of the Theoretical Technology Value Framework, it is expected to be updated subject to the responses from the participants.*
6. **The Principle of Multiple Interpretations.** Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it. *Critical Systems Heuristics will be employed as a mechanism to guide the interviewer when he is confronted by contradictory responses from participants.*
7. **The Principle of Suspicion.** Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants. *Similar to the previous principle, Critical Systems Heuristics will be employed as a mechanism to guide the interviewer when he is confronted by contradictory responses from participants.*

Oates (2006) notes that qualitative data analysis is generally applied to studies where researchers follow interpretive or critical research approaches. These approaches are informed by the requirement to perform textual analysis on verbal or written data. While Merriam & Tisdell (2015) provide a diagrammatic delineation and extensive discussion on six types of qualitative research (Refer to Figure 3.1), they stress that a "basic" qualitative research study:

> "… is by far the most common type of qualitative study found in education and most likely in other fields of practice; other texts on qualitative research often fail to address the fact that you can conduct a qualitative study without it becoming a particular type of qualitative study (such as phenomenological study, a narrative enquiry, and so on)." (page xii)

In keeping with the foregoing statement and the succinct descriptions of the six types of qualitative research approaches depicted in Figure 3.2, the author elected to follow a basic qualitative research study. This approach most closely aligns to the method of data gathering by interviewing a purposeful sample of individuals from a particular population. Moreover, data gathered would allow for inductive and comparative analyses, providing for findings that are richly descriptive and may be presented as common themes.

Thus, the survey based research approach applies an interpretive study approach (Creswell, 2014), as the framework for model building, data collection and analysis. Research instruments are adopted as an efficient means of collecting emotional as well as factual information. The terms 'surveys' and 'questionnaires' are sometimes used interchangeably, but to be more concise the term survey refers to the technique or method used (Creswell, 2014), whereas the term questionnaire relates to the actual list of questions (Oates, 2006).

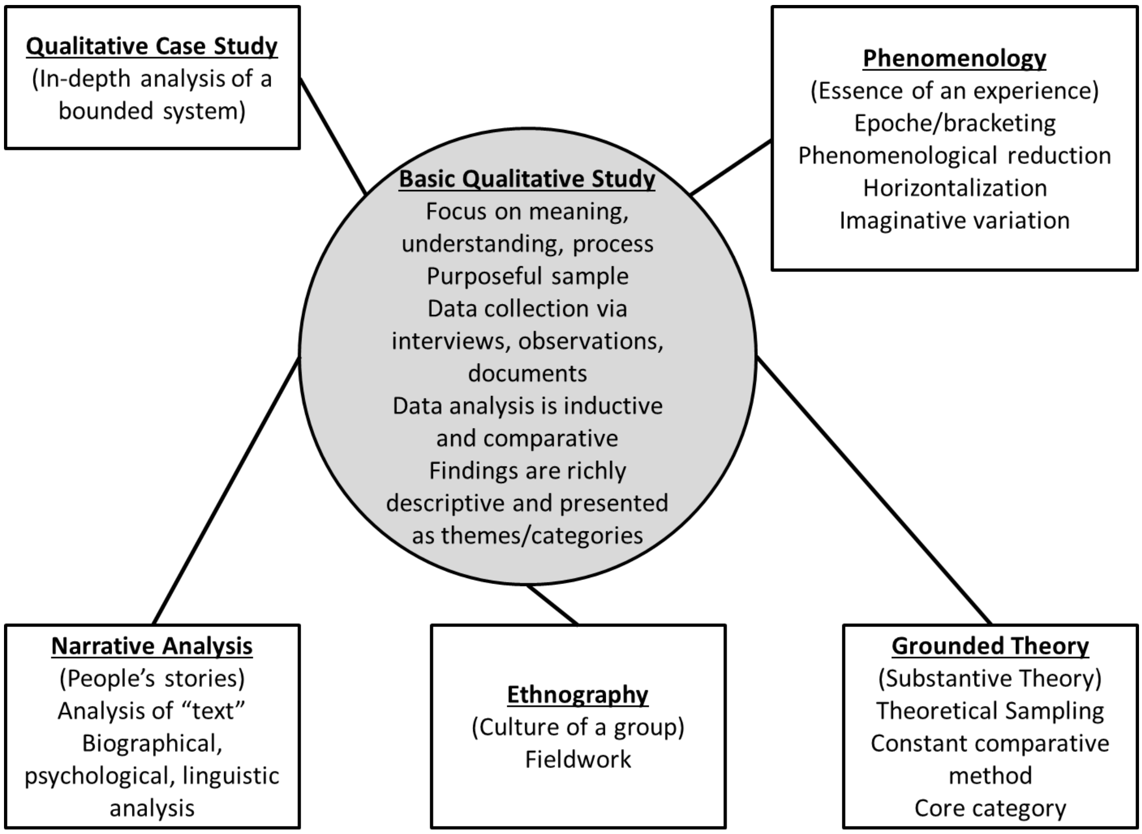


FIGURE 3.1 TYPES OF QUALITATIVE RESEARCH (MERRIAM & TISDELL, 2015)

The advantages of an interpretive research approach, and particularly the interview instrument, are stated by Walker (1985) to be the familiarity of respondents to an interview structure, the ability to discuss complex issues, and the adaptive characteristics inherent to the approach. The disadvantages of this approach include the impact of the author on the process, confidentiality concerns of respondents and the possibility of differing interpretations of questions.

Throughout the data collection process, the focus centred on understanding the reciprocal relationship between the end-user and the IS, and on how an imbalance within this relationship inadvertently destroys organisational value. Hence, end-user behaviour was adopted as the dependant variable of this study.

3.3 QUANTITATIVE RESEARCH APPROACHES

Oates (2006) notes that quantitative data analysis generally delivers statistics that may be organised into tables, charts and graphs, which are commonly acceptable techniques that allow the researcher and the readers to visualise data patterns.

Quantitative data is generally gathered by moving from post-positivist philosophical assumptions (Creswell, 2014). He goes on to suggest that central to the answering of questions and hypotheses, is an examination of the relationships among and between variables. Creswell (2014) moreover suggests that quantitative data is generated though either experiments or surveys. Since this thesis concerns itself with the reciprocal relationship between humans and IS within the context of a financial institution, the reasonable approach was to develop surveys containing close-ended questions, that would generate data suitable for various statistical analyses.

3.4 APPROACH TO RESEARCH

In his argument for bridging the gap between researchers' tendencies to either generalise or specify, Larsson (1993) notes that researchers traditionally tend to favour one of two major methods for gathering data namely:

> "The nomothetic survey method, which emphasizes quantitative analysis of a few variables across large samples <u>or</u> the idiographic case study method, which focuses primarily on the qualitative, multi-aspect, in-depth study of one or a few cases." (p1515)

The research technique incorporates both data gathering survey methods into a mixed methods research approach as discussed next section.

A distinguishing characteristic of research within the field of IS, is that it considers the use of artefacts in human-machine systems (Gregor, 2002). In his editorial commentary to the MIS Quarterly, Lee (2001) argues that more than just the technological system or just the social system or even both these systems, side by side, are examined within the research field of IS. He further notes that an investigation into an IS essentially develops within the broader scope of IS research towards the actual phenomena that emerges when social systems and IS interact. The research design moves from the premise that IS are complex and that any research, in an effort to understand some particular phenomenon in IS, needs to make provision for both qualitative as well as quantitative approaches.

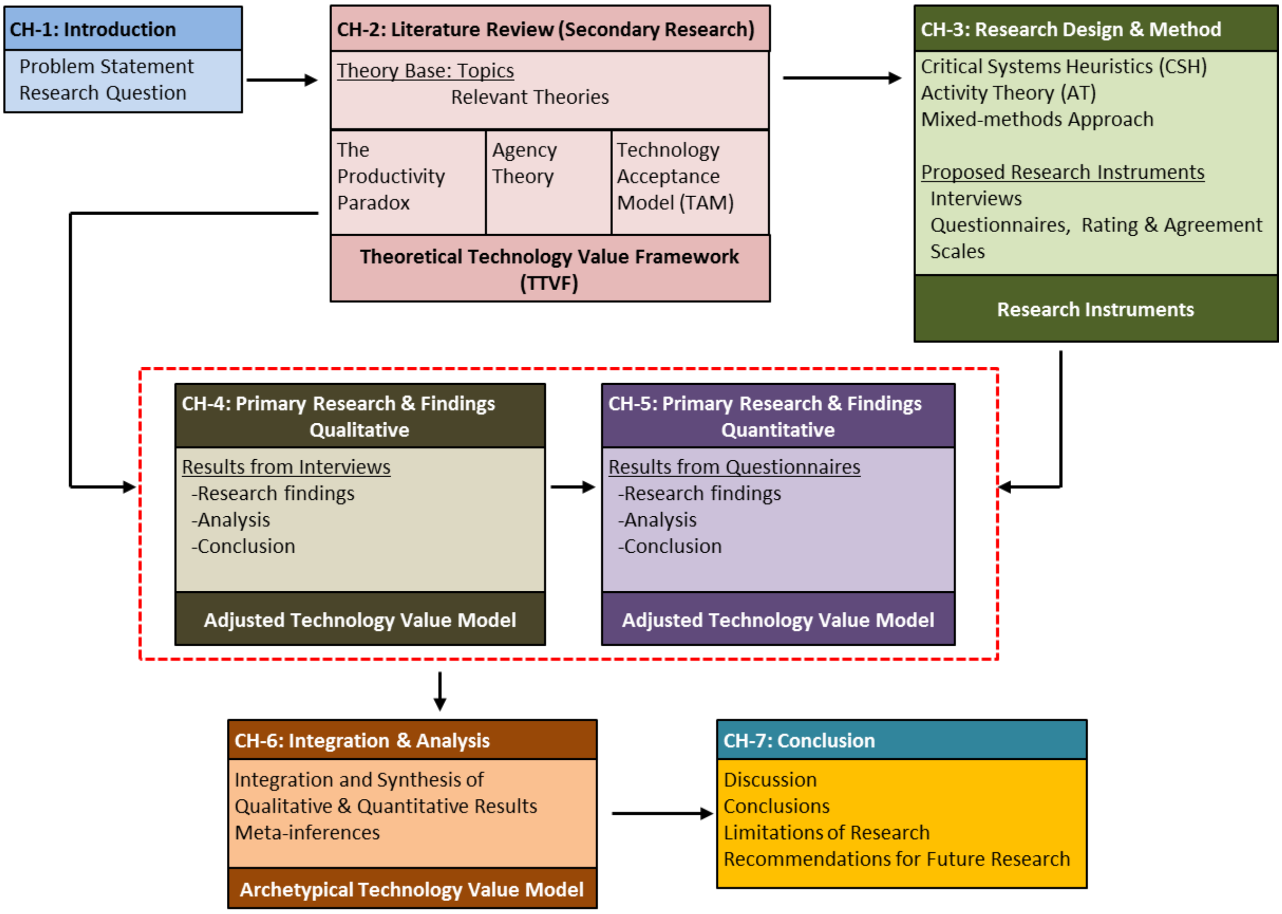


FIGURE 3.2 PRIMARY RESEARCH APPROACH (AUTHOR)

As delineated in Figure 3.2, a mixed methods approach is followed in this thesis. Moreover, a multimethod research approach is followed for the qualitative component of the research by integrating two congruent frameworks namely Critical Systems Heuristics and Activity Theory. Lewis (2004, 2007) recognises these two theories as complementary, noting that both allocate particular focus to the influences of human intentionality. He concludes that by combining these two theories into a powerful conceptual tool, this tool will provide practical applicability within a range of areas throughout the domain of IS.

Through an explanatory process this chapter shapes the justification for the application of the methodology used to conduct the research. Mingers & White (2009) place systems thinking as implicit in most IS research initiatives. Thus, the development of systems thinking, leading to the conceptualisation of Boundary Critique and Critical Systems Heuristics, will be discussed. This will be followed by an introduction into

Activity Theory, which serves as both a complementary tool to Critical Systems Heuristics and the primary research methodology for this study.

Firstly, the literature embracing Critical Systems Thinking in general and Critical Systems Heuristics in particular will be discussed. Next, Activity Theory, as a complementary methodology to Critical Systems Heuristics and Boundary Critique will be discussed, followed by a review of the research instruments to be used. Issues of data collection and analysis in relation to the study will be highlighted, followed by a discussion on the validity and reliability of the study.

While both Boundary Critique and Critical Systems Heuristics will be further expounded later in this chapter, it may be pertinent to clarify the relationship between these two concepts upfront.

Critical Systems Heuristics is proposed as a particular problem solving technique supporting the practice of systematic Boundary Critique or as described by Mingers & White (2009), a set of questions that challenge the boundaries set by experts. Ulrich & Reynolds (2010) advises that Boundary Critique should be understood as a reflective framework which generally operates in the background, and that the author’s focus should not be directed towards the continual discussion of Boundary Critique concepts and questions, but rather allowing Boundary Critique to continually inform his critical thinking process.

The process flow, driving the primary research approach as depicted in Figure 3.2, illustrates the iterative refinement of the proposed conceptual Theoretical Technology Value Framework that incrementally moves towards the development of the Archetypical Technology Value Framework.

Firstly, the data from the literature review is conceptualised into a proposed framework which in turn serves as a base from which empirical research is initiated on the value generating or eroding elements endemic within IS usage. Feedback from the initial qualitative research approach, in the form of interviews and informed by Boundary Critique, Critical Systems Heuristics and Activity Theory, serve as a next level of refinement towards the development of an Adjusted Technology Value Model. Then, data from questionnaires and rating & agreement scales, evaluated via various complementary statistical analyses techniques, augment the next level of enhancement towards the establishment of an Adjusted Technology Value Model. Finally, a synthesis of the mixed methods research results, are employed as refining tools to tweak the models towards the formation of an Archetypical Technology Value Model. With the creation of the Archetypical Technology Value Model, the primary objective of this study, i.e. to construct an empirically validated model through which the unintended business value dissipating effects on financial institutions, as a direct result of the adoption and use of an IS, can be investigated and moderated, will be realised.

The following sections outline the mixed methods approaches employed to conduct the research, which follows a hybrid data gathering technique, incorporating both nomothetic and idiographic methods, which together enriches the process of data collection.

3.5 RESEARCH DESIGN: MIXED METHODS APPROACH

The advantages of mixing qualitative and quantitative data collection in a single study has been demonstrated by some authors, e.g. (Creswell *et al*., 2003). The rationale of adopting a mixed methods approach for this thesis was essentially for the purposes of establishing a rich emergent source of information, mutually informed by both qualitative and quantitative data. Mixed methods research in IS has been applied extensively by IS researchers for over a decade, among others (Song Ang, Koh, Ang, & Straub, 2004; Soon Ang & Slaughter, 2001; Becerra-Fernandez & Sabherwal, 2001; Bhattacherjee & Premkumar, 2004; Chang, 2006; Dennis & Garfield, 2003; Grimsley & Meehan, 2007; Hackney, Jones, & Lösch, 2007; Ho, Ang, & Straub, 2003; Keil, Im, & Mahring, 2007; Piccoli & Ives, 2003; Soffer & Hadar, 2007).

Bryman (2007) argues that the advancement of mixed methods research is hindered by the tendency of researchers to not properly integrate conclusions from qualitative and quantitative findings. He then suggests that the value and ultimate purpose of mixed methods research lies in the mutual illumination of the qualitative and quantitative data analysis, interpretation and recording components of the research enterprise.

Venkatesh, Brown, & Bala (2013) however caution that mixed methods research should only be employed in the case where a holistic understanding of a phenomenon is required alongside extant literature that is fragmented, inconclusive and equivocal. Their ensuing example provided by Venkatesh *et al*. (2013) to illustrate their point has a similar focus to this thesis, as it involves the impact of IS (positive or negative) on employees' work performance.

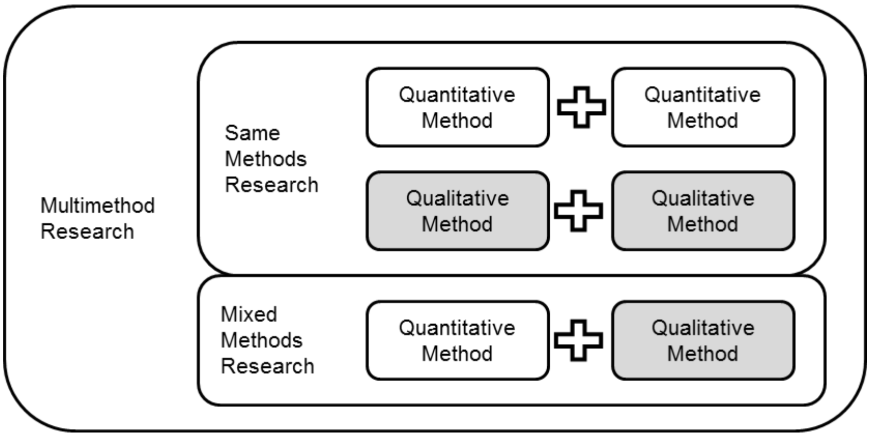


FIGURE 3.3 POSITIONING MIXED METHODS RESEARCH WITHIN MULTIMETHOD RESEARCH (AUTHOR)

Agerfalk (2013) defines mixed methods research as the combination of both quantitative (typically positivist) and qualitative (often interpretivist) methods within a single study. For completeness sake it is worth noting that mixed methods research is a subset of multimethod research as shown in Figure 3.3. Method, within the context of the figure, refers to the worldview i.e. ontological predisposition of the researcher and not the research instrument. Agerfalk (2013) continues by suggesting the entertaining of the tension between different worldviews and paradigms to be one of the most potentially useful aspects of mixed methods research.

Bhattacherjee (2012) submits that for scientific study, the type of data that needs to be collected and the sources from where or whom it needs to be collected, are subject to the unit of analysis under investigation. Drawing from Activity Theory, the unit of analysis is defined as motivated activity, i.e. a conscious action directed toward a goal (Allen *et al*., 2011; Sam, 2012). Within this study, the qualitative population comprised middle and senior managers as well as divisional executives employed at a South African based financial institution. Senior employees (executives and senior managers) were generally selected from particular teams for their knowledge and experience in the management of IS operations and strategy formulation. In contrast, the quantitative population, from the same company, also comprised individuals who are required to make use of various IS in order to successfully perform various job specific tasks.

From their review on mixed methods research within IS, Venkatesh *et al*. (2013) highlighted three particular aspects that need to be considered when conducting research namely: the appropriateness of the mixed methods approach, the development of meta-inferences, i.e. substantive theory, and the assessment of the quality of meta-inferences, i.e. the validation process applied within the mixed methods research. Meta-inferences are described by Venkatesh *et al*. (2013) to be the integration of the findings from qualitative and quantitative studies. They go on to encapsulate their findings in a tabularised set of guidelines (Appendix B) that was hence adopted in conducting the primary research.

Two established data collection techniques, namely interviews and questionnaires, incorporating rating & agreement scales, were utilised in this study.

1. A sequential mixed methods research design was followed. This approach allowed for the movement of the data collection process from an interpretative epistemological base towards a qualitative methodology, finding expression in semi-structured interviews.
2. Next, the process was re-initiated within the positivist epistemological base moving towards a quantitative methodology manifesting in the development of questionnaires. The Adjusted Technology Value Models were positioned to form an epistemological bridge between the two methodological approaches.
3. Finally, the Adjusted Technology Value Models were utilised to serve as both a confirmation (triangulation) of data collected through the interviews and questionnaires, and to refine the data into a parsimonious framework. The sequential mixed methods research design approach is illustrated below.

The sequential design followed in this research is derived from the *Sequential Exploratory Design* model proposed by Creswell *et al*. (2003) and depicted in Figure 3.4. Where "**QUAL** Data Collection" represents the data collected via the interview process, "quan Data Collection" represents the data collected via the questionnaires.

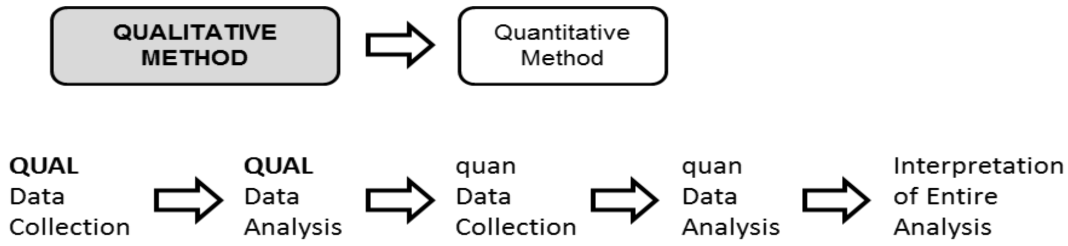


FIGURE 3.4 SEQUENTIAL EXPLORATORY DESIGN (CRESWELL *ET AL*., 2003)

Next, a discussion on the progression from General Systems Theory towards Critical Systems Heuristics is provided.

3.6 SYSTEMS

Since the research method combines Activity Theory with Critical System Heuristics, a brief introduction into systems thinking in general and Critical Systems Heuristics in particular, is provided. Katz & Kahn (1966) note that system theory concerns itself with: "problems of relationships, of structure, and of interdependence rather than with constant attributes of objects". Checkland & Howell (1998) define an organisation as "a socio-technical system" where the functional parts of people, processes and systems are all interconnected, and where a change on any of these parts will have an effect on all the others. Moreover, Mingers & White (2009) state that while systems thinking is a discipline in its own right which, due to its generality, is applicable to almost any problem situation, one must take care to be selective in one's review of it.

3.6.1 Systems Thinking

The proposed phenomenon of an IS as both a value creating and value dissipating artefact will be discussed against the background of its setting inside an organisation consisting of people, processes and technology. The discussion will proceed from the premise that the principles governing an IS are informed by the theories of Critical Systems Thinking in general and Soft Systems Thinking in particular. Jackson (2003) suggests that part of being holistic in his problem solving approach, a researcher is required to understand and employ system language. Refer to Appendix A for a table of system concepts and terms as compiled by Ackoff (1971). A dialectical systems thinking approach is held in this research of which a key tenet is the understanding of a system as an intellectual construct designed to clarify certain aspects of reality while necessarily ignoring or even distorting others (Levins, 1998).

When considering the systems and processes operating within an organisation it is important to keep in mind that an organisation is not simply a directionless organism guided by mere mechanical forces, but always ever moves towards a certain objective or goal. In their book on the social psychology of organisations, Katz & Kahn (1966) argue that a teleological approach to understanding organisations serve as both a help and a hindrance. On the one hand human purpose is by default build into organisations and must be considered as a source of information when studying a phenomenon within the organisation, while at the same time keeping in mind that many processes are incorporated within the organisation which have little to do with the organisation's rational purpose. Thus, Katz & Kahn (1966) conclude that the stated purposes of an organisation as presented by its leaders in formal reports may be misleading. Similar to the earlier discussion on the agency problem, they call for a clear distinction between the goals and purposes of organisations (its founders and key members, thinking within teleological terms) and the goals and purposes of its individual members (employees). Bandura (1986), moreover stresses that social sanctions are not necessarily adopted as personal standards by individuals.

In his book 'The fifth discipline', Peter Senge argues that five disciplines underpin learning organisations namely: personal mastery, mental models, shared vision, team learning and systems thinking. The latter is stated to provide substance to the other four disciplines and hence to the learning organisation as a whole (Senge, 1990). Further, Checkland (1999) defines the central image to systems thinking as "the adaptive whole" which is described within three ideas namely:

1. **Emergent properties:** The observable properties of an entity which makes it more than the sum of its parts. Flood (2010) identifies emergence and interrelatedness as the fundamental ideas of systems thinking.
2. **Layered structure:** A whole with emergent properties may be composed of a next layer of wholes, each with their own emergent properties and so on and so forth.
3. **Processes of communication and Control:** Since the whole entity is characterised by its ability to adapt and survive within a changing environment, it requires some means of finding out about its environment as well as responding appropriately to it.

In summarising the systems thinking concept, Mingers & White (2009) propose any systems thinking approach to be defined by four fundamental systems ideas, namely:

1. **Holistic view:** Situations are perceived as being composed of a holistically (as opposed to reductionistically) bound set of diverse interacting elements within an environment.
2. **Interactions between elements:** When attempting to determine the behaviour in systems, the relationships or interactions between elements are seen to be of greater import than the elements in themselves.
3. **System hierarchy:** The existence of a hierarchy or levels within a system results in both the emergence of system properties at different levels and the development of mutual causality within and between different levels.
4. **Intentional rationality:** Within social systems, individuals can be expected to behave with differing purposes or rationalities.

In general, systems thinking is defined as the process of understanding how a system behaves, interacts with its environment and reciprocally influences other systems. More specifically the behaviour, interaction and influence of social organisations, both natural and designed (as in the case of a business organisation), are considered. Caution must however be used whenever reality is modelled into a system or abstraction of reality, as it can never be more existent or accurate than actual reality (Neumann, 2013). Typically a business organisation that is regarded as containing people, processes and technologies, possesses all the key elements required to be governed by the principles of systems thinking. Or, as Ackoff (1971) puts it, an organisation is a special type of system, not least because (1) it consists of elements that are volitional, (2) it has a functional division of labour in pursuit of common purposes from the elements that define it, (3) the parts of the system can respond to each other through observation and communication, and (4) at least one subset of the system has a system control function. More specifically an organisation is classified by Katz & Kahn (1966) as an open system subject to the following nine characteristics which define all open systems:

1. Importation of energy: All open systems need to import energy from the external environment in order to survive, similarly organisations are reliant on other institutions or people or the material environment for renewed supplies of energy. As a social structure an organisation cannot be deemed to be self-sufficient or self-contained.

2. The through-put: Since open systems typically transform the energy available to them, organisations are seen to create value by the creation of new products or processed products or services, etc. through the reorganisation of inputs by an activity called 'work'.

3. The output: Open systems export some *finished* product into the environment.

4. Systems as cycles of events: The open system is characterised by a cyclic pattern of activities of energy exchange. Finished products exported into the environment in turn provide sources of energy for the repetition of the cycle. It is further within the context of this cyclic pattern that the concept of structure or the relatedness of parts is observed. Structure comprises the physical arrangement of things where both the larger unit is bounded within a referent environment and its subparts are in turn bounded within the larger unit. Katz & Kahn (1966) make the point that since events, rather than things, are structured, social structure must be considered as a dynamic rather than static concept. Moving from this premise, they emphasise that human behaviour can only be characterised as evidencing structure in the event where there is some closure to the chain by a return to its point of origin, and the probability that the chain of events will be repeated. Considered within the context of the adoption and use of an IS, a

proper structure will only exist where a loop exists between the work performed by the system user, the value output produced by the user through the use of the system, feeding back to the system user.

5. Negative entropy: The flow of energy out of the system cannot surpass the flow of energy into the system if the organisation is to survive. If this is to happen the organisation will revert toward a state of disorganisation and eventual expiration. The aim of an organisation will not be to only arrest the entropic process but also move towards a state of negative entropy enabling it to store energy. Moreover, the organisation will do well to not only generate more energy than what it expends but also conserve energy, i.e. prevent value destruction resulting in energy losses.

6. Information input, negative feedback, and the coding process: An open system is dependent on informative inputs from both the status of its environment and from within, concerning its own functioning in relation to the environment. Ulrich (1988) further suggests that since an open system is strongly interconnected with its environment, it cannot be fully controlled by decision makers. Moreover, in its simplest form informative inputs are described as negative feedback, which allows the system to correct from unintended or unwanted deviations. Without corrective devices providing negative feedback, the system will deteriorate towards a state of energy inefficiency where it may ultimately cease to be a system. Of importance to note is that the reception of inputs into a system is selective, i.e. systems and subsystems within a larger system will only be positioned to react to information signals to which they are specifically attuned. Katz & Kahn (1966) defines 'coding' as the process of employing the selective mechanisms of a system to either accept and translate or reject inputs. They further observe that the coding mechanisms of a system are defined by the functions it performs, which in turn perpetuate the type of functioning.

7. The steady state of dynamic homeostasis: Surviving open systems are characterised by a steady state, albeit not a stationary state or a state of true equilibrium. In the event of a disaster resulting in damage to or the destruction of a key server, the organisation's disaster recovery plan may be invoked, resulting in the movement of transactions to a

backup server at the disaster recovery site, and work-around being set in place until the operation of the original server is restored.

8. Differentiation: As a system moves in the direction of continuous differentiation and elaboration the earlier processes of interaction between various dynamic forces are replaced by the use of regulatory feedback mechanisms. Within organisations where the multiplication and elaboration of roles result in greater specialisation of functions, information asymmetry may induce the agency problem.

9. Equifinality: The phenomenon where a system is able to reach a specific final state from differing initial conditions and by a variety of paths is termed equifinality. However, as regulatory feedback mechanisms become dominant in operational control, the amount of equifinality may be reduced.

Flood (2010) notes that the component elements of a system cannot be understood in isolation but rather as each element relates to other elements within the system, and with other systems. The focus of system thinking proposes a cyclical rather than linear cause and effect relationship between elements. It follows that a systems thinking approach to problem solving in an organisation will ensure that each problem is viewed as an integrated part of an overall larger system. Therefore, a proposed solution to it may potentially impact other elements of the system causing the development of unintentional outcomes, events or secondary problems. The potential value of a solution can consequently only be understood and judged in its relation to the system as a whole.

Systems thinking applied in complex systems, explain how potentially small catalytic events that are separated by distance and time can be the cause of important changes. Conversely, an improvement of one component element of a system can favourably affect another area of the system, especially in an organisation where communication between components is reciprocal (Senge, 1990).

In considering the development of the system movement, three noteworthy paradigm shifts, leading on from Peter Checkland's system thinking, are proposed by Zexian & Xuhui (2010). The initial shift moved from general system thinking to applied systems thinking. This was followed by transference within applied system thinking from hard to soft system thinking. Finally, applied system thinking diverted away from functionalism toward a more valid approach when dealing with the human dynamic namely the interpretive paradigm borrowed from sociology. A succinct account of the development in systems thinking follows:

3.6.2 General Systems Theory

Since systems thinking will be employed in this study to address real world problems, the advice from Zexian & Xuhui (2010) is noted, in that the real world should be categorised in system language since such classification will assist in the finding of an appropriate method and methodology to deal with specific problematic situations. As one of the founders of General Systems Theory, Ludwig von Bertalanffy simply defined a system as a set of elements standing in interrelation among themselves and within their environment (Von Bertalanffy, 1972). Newman & Peery (1972) commend on General Systems Theory, citing its growing popularity as a result of its apparent ability to serve as a universal conceptual paradigm of living systems and, more specifically, organisations. However, they highlight the premises of consensus, growth, and hierarchy as potential limitations in the application of General Systems Theory to organisational enquiry. While General Systems Theory initially showed much promise, its ontological limitation of single view reality would be the salient disqualifier for its usefulness to this study. Also, General Systems Theory cannot provide any practical methodologies when dealing with organised complexity of real world problems within the milieu of human affairs. Zexian & Xuhui (2010) argue that this is due to the inability of General Systems Theory to effectively coordinate the mutually exclusive status between Holism and reductionism.

From an epistemological position, the latter is understood as creating knowledge of phenomena by breaking it down into its constituent parts and then studying each discrete element in terms of cause and effect (Flood, 2010). In contrast to reductionism Flood (2010) states that systems thinking moves from the premise that the world is systemic, suggesting that phenomena should be understood as an emergent property of an interrelated whole. He reinforces this view stating that “valid knowledge and meaningful understanding comes from building up whole pictures of phenomena and not by breaking them into parts.” However, Zexian & Xuhui (2010) argue for a more inclusive approach in dealing with organised complexity by opposing exclusion of either Holism and reductionism. They go on to credit Checkland with identifying this gap, and promoting the system thinking transfer from General Systems Theory to Applied System Thinking. The paradigm shift did not only provide practical system concepts but also resulted in the development of the Soft Systems Methodology which has found wide recognition within society.

3.6.3 Hard Systems Thinking

Akin to General Systems Theory, Hard Systems Thinking has proved incapable of providing usable results when applied to human affairs. Zexian & Xuhui (2010) echoes this sentiment arguing that this is due to Hard Systems Thinking preferring an analytical approach of reductionism or functionalism, since both are informed by positivism. Checkland (1981) admits that Hard Systems Thinking is inherently weak when applied to the diversity of the human activity system. This is shown to be especially evident when the differences and conflicts of worldviews and values within human organisation are explored. The usefulness of a model has a direct dependence to its ability to explain observed phenomena. Neumann (2013) notes that a model has no utility if it lacks sound explanation for observed phenomena. He goes on to suggest the need to move from a reductionist to a holistic model. The problem with the reductionistic approach is clarified by Flood (2010) in his observation that science through reductionism separates problems, apparently caused by individuals from the complex dynamics of each unique context. This is supported by Zexian & Xuhui (2010) lamenting that the complexity of human affairs cannot be addressed by Hard Systems Thinking as it ignores some basic elements constituting human organisation, among other things, diverse world views, values and interests. The essential difference between Hard Systems Thinking and Soft Systems Thinking (the topic of the next section) as distinguished by Checkland (1999), is that Hard Systems Thinking assumes that systems which can be engineered to achieve specific objectives, essentially exist in the world. Whereas, Soft Systems Thinking moves from the premise that the world is problematic and always more complex than our explanation of it, nevertheless the process of enquiry into the world can be applied as a learning system, allowing soft systems thinkers to intentionally choose to adopt a hard stance, if they desired.

The next section will introduce the concept of Soft Systems Thinking. Flood (2010) is at pains to stress that Soft Systems Thinking focuses on the process of meaning construction through systemic concepts and, in doing so, Soft Systems Thinking confines change in social situations to the changing of individuals' world-views. He does caution, however, that systems thinking still has a point to make since constructions do exist in the world, e.g. economic and political structures. He finally suggests that if change is desired, it may be necessary to recognise these structures which may require transformation in conjunction with the changing of individuals' world-views.

3.6.4 Soft Systems Thinking

As noted in the previous section Zexian & Xuhui (2010) state that both Hard Systems Thinking and functionalism are informed by positivism. In contrast, they correctly recognized Soft Systems Thinking and interpretive paradigm as both being equally informed by phenomenology, the task of which is to "observe, describe, identify and distinguish the meaning given by a human being." Checkland & Poulter (2006), support this view in stating that a shift was brought about within social theory with the emergence of Soft Systems Thinking, providing the intellectual foundations for Soft Systems Methodology (Flood, 2010), which moved from functionalism to interpretive sociology. In contrast to Hard Systems Thinking, the ontological base of Soft Systems Thinking does not view a system as an objective part (Zexian & Xuhui, 2010), but rather as a part of a systemic world. From the philosophical premise they proceed to observe that these theories do not only employ differing analysis methods but also differ epistemologically in their approaches of knowledge gain. Within a systemic world Katz & Kahn (1966) caution that a system cannot be understood without an understanding of the forces that impinge upon it. They clarify this statement by noting that typical models of organisational theory should not simply focus on principles of internal functioning as if these problems were independent of changes in the external environment, since this could lead to coordination and control becoming ends in themselves, rather than a means to an end.

Soft Systems Thinking is a form of systemic thinking that "understands reality as the creative construction of human beings" (Jackson, 1991). This is supported by Flood (2010) in his commentary on systemic thinking as being useful in meaning construction. While Hard Systems Thinking makes a clear distinction between the objective observer and object being studied, Soft Systems Thinking is bounded by the epistemological periphery where knowledge and truth is a construction of reality based on inter-subjectivity. Reynolds (2005) highlights this view, noting that the goal of systems practice is not to unveil some absolute truth about some objective social reality, but rather a process of enquiry, enhancing the collective social well-being. Zexian & Xuhui (2010) build on this reasoning, proposing that Soft Systems Thinking considers the interaction and interdependence between observer and observed object to create a problematic situation. The observer is involved in the observed situation.

While Hard Systems Thinking considers organisations as rationally arranged goal seeking mechanisms, where humans are placed on the same level with other organisational components, Soft Systems Thinking moves from the premise that organisations are complex, ever changing social entities where the individuals, who form the organisation, contribute a unique dynamic element which continually refines the nature of the organisation. In this sense the organism can be said to patently behave in a way that is "more than the sum of its parts" (Flood, 2010).

3.6.5 Holis

Ackoff (1971) makes the point that a systems approach to problems should focus on the system taken as a whole and not on the parts taken separately. He proceeds to build on this view by noting that, while every part within a system may perform optimally relatively to its own objectives, this provides no assurance that the total system will perform optimally relative to its objectives. Jackson (2003) later supports this view, noting that solutions that simply focus on parts of an organisation, rather than the whole, will fail to recognise the crucial interactions between the individual parts. One however needs to be cognisant to not, as Levins (1998) puts it, ignore the autonomy of the parts in favour of stressing the connectedness of the world. The first contemporary discussion on the notion of 'Holon' is ascribed to Koestler (1967), who described it as a kind of hierarchical structure that is at once whole, and made up of subordinate parts that operate within a continuum of independent feedback and feeds forward streams of an object extended to its larger environment. Checkland (1995) describes holons as models of human activity systems or “abstract notions of purposeful wholes” which he suggests as being an important topic for debate, even though these holons may or may not map appositely into perceived reality.

Checkland & Scholes (1990) explain the notion of holon in their pursuit of defining the ‘human activity system’ as a whole by framing the concept within the term of a “purposeful holon”. Neumann (2013) states that Holism in its purest sense, however, means that we can explain why something is without being able to make any predictions about it or having a deeper understanding of the underlying reasons. It remains a so-called black box—and it is unable to help us make the right decisions.

Checkland (1988) adopts the preceding thoughts stating that “system thinking can be regarded as ‘holonic thinking’’’. He then proceeds to apply the concept to Soft Systems Methodology, stating that this methodology can be defined as a cyclic inquiry holon which in turn makes use of numerous holons within its processes (Checkland & Scholes, 1990). The preference by Checkland in his use of the term *Holon* in lieu of *System,* stems from his argument that the concept of holon provides a richer context to the idea of systems within the discussion of Soft Systems Thinking. Zexian & Xuhui (2010) support this frontward step within Soft Systems Thinking with their argument that humans are the constructors of subjective epistemological concepts which we call systems, contrary to the original view of systems as objective entities in the world. Flood (2010) expands this thinking further, adding that systemic thinking rejects the existence of real social systems as subcomponents constructing a concrete social world.

3.6.6 Critical Systems Thinking

The concept of Critical Systems Thinking is not defined by a single approach or set of principles. Following on from Bammer (2003), Critical Systems Thinking "aims to combine systems thinking and participatory methods to address the challenges of problems characterised by large scale, complexity, uncertainty, impermanence, and imperfection. It allows nonlinear relationships, feedback loops, hierarchies, emergent properties and so on to be taken into account."

Flood (2010) lists six core commitments that he deems necessary to ensure integrity within the diversity prevalent amongst critical systems thinkers, namely a commitment to the systems idea, critical awareness, social awareness, human emancipation, theoretical complementarity, and methodological complementarity. The last five commitments are attributed to Jackson (1991).

Critical Systems Thinking has particularly problematized the issue of boundaries and their consequences for inclusion, exclusion and marginalisation (Bammer, 2003). In the next subsection the concepts defining the interaction between participants within an organisational system is explored within the contextual framework of Boundary Critique. In his critiques on Critical Systems Thinking, Ulrich (2003) argues that while on the one hand: "Systems thinking without critique is blind with respect to its underpinning boundary judgements and their normative implications" on the other hand "critique without systems thinking is boundless, and ultimately empty, in that its object and context of valid application remain arbitrary", which led him to the development of Boundary Critique and Critical Systems Heuristics. He points out that the development of Critical Systems Heuristics signified the first systematic attempt to provide a philosophical foundation as well as practical framework for Critical Systems Thinking. In addition, Ulrich & Reynolds (2010) argue that Critical Systems Heuristics is positioned to meaningfully influence critical systems thinking, which is discussed later on in this chapter.

3.6.7 Boundary Critique

Boundary Critique is a central concept in critical systems thinking, following on from Ulrich (2002) who noted that "both the meaning and the validity of professional propositions always depend on boundary judgments as to what 'facts' (observations) and 'norms' (valuation standards) are to be considered relevant and what not." He argues that three basic requirements need to be realised with the systematic process of Boundary Critique, namely:

1. It needs to identify the sources of selectivity that condition a claim, by surfacing its underpinning boundary judgments.
2. It needs to question these boundary judgments with respect to their practical and ethical implications and to surface options, through discussions with all concerned stakeholders (note that their selection in turn represents a boundary judgment in need of critique).
3. Based on these two critical efforts it may then become necessary to challenge unqualified claims to knowledge or rationality by compelling argumentation, through the emancipatory use of Boundary Critique.

From the above it is evident that the purpose of Boundary Critique is not, as Ulrich (2003) cautions, boundary setting but rather boundary testing. Moreover, Boundary Critique is not only a demarcation of which elements should comprise a construct, but also an explicit (critical) approach of decision making as to why elements are included or excluded. The definition of a construct within the context of this thesis is borrowed from Bhattacherjee (2012) who defined it as an abstract concept that is specifically chosen or created to explain a particular phenomenon. Ulrich (2005) suggests that any partiality in an individual's behaviour, be properly recognised as amounting to some form of a boundary judgement. A critical approach to the handling of boundary judgements implies both 'self-critically' questioning one's own claims, and also 'thinking for oneself' before adopting the claims of others (Ulrich & Reynolds, 2010). Moreover, Reynolds (2005) argues that an open system does not imply the absence of boundaries but rather a need for a potential change in boundary judgements.

Midgley, Munlo, & Brown (1998) observe that critique of boundary judgements is necessary for the very fact that, while understanding is guaranteed to be limited, simultaneously there exists the possibility that limitations may be minimised. Ulrich (2000) further clarifies this idea in his essay on the contribution of Critical Systems Thinking, stating that the concept of boundary judgements, the way in which a relevant reference system is bound, will give meaning to the proposition. He proceeds to caution that the relevant facts and values will change the moment we change our boundary judgements, that is to say, the moment we decide what falls within the relevance of the system of concern and what falls outside its boundaries. Kagan, Caton, Amin, & Choudry (2005) furthermore explain this concept by stressing that if narrowly defined boundaries are pushed out beyond some criteria that is deemed relevant to the overall success of a project, these criteria may become irrelevant.

Ulrich (2000) delineates the interdependence of boundary judgements in Figure 3.5, stating that: “The facts we observe, and the way we evaluate them, depend on how we bound the system of concern. Different value judgements can prompt us to change boundary judgements, which in turn make the facts look different. Knowledge of new facts can equally make us change boundary judgements, which in turn makes previous evaluations look different, etc.” Thus, in following this process of systemic triangulation, Reynolds (2008) and Ulrich (2003) argue that each of the corners must be considered in the light of the other two. Moreover, Ulrich & Reynolds (2010), observe that irrespective of a researcher’s preferred methodology applied within a particular situation, it cannot supersede a careful handling of the eternal triangle that is at work in all his findings and conclusions. “Any claim that does not reflect on the underpinning ‘triangle’ of boundary judgements, judgements of facts and value judgements, risks claiming too much, by not disclosing its built-in selectivity” (Ulrich, 2003).

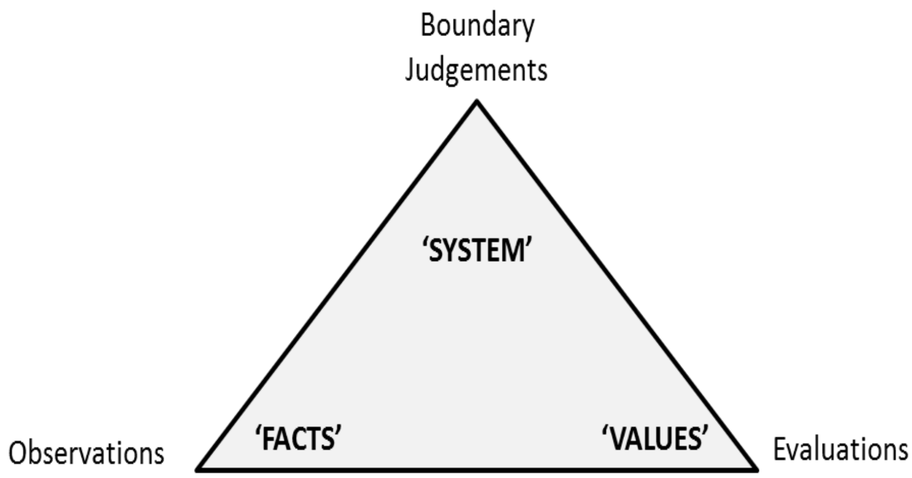


FIGURE 3.5 INTERDEPENDENCE OF BOUNDARY JUDGEMENTS, OBSERVATIONS, AND EVALUATIONS (Ulrich, 2000)

Since differing boundary judgements make for differing referencing systems, individuals who do not realise that they are disagreeing on different issues, will unwittingly be informed by different facts and value judgements, and they will subsequently not understand the underlying reason for their differences. If we allow ourselves to appreciate the other party's differing rationality, "we need not agree in order to understand why we don't", and "before we can meaningfully identify and judge relevant facts and values, we have to delimit the situation of interest – not only in space and time but also in respect of our intentions" (Ulrich, 2000).

Ulrich (2005) next suggests that a systematic process of Boundary Critique comprises the following five tasks:

1. It needs to identify the sources of selectivity that condition a claim, by surfacing the underpinning boundary judgments.
2. It needs to examine these boundary judgments regarding their practical and ethical implications; what difference do they make to the way we see the situation in question?
3. It needs to find options for determining the reference system that conditions a claim, by giving alternative answers to some of the boundary questions; for only in the light of alternative reference systems can we fully appreciate the selectivity of the present one.
4. It needs to seek some mutual understanding with all the stakeholders concerned regarding their different reference systems. If in the process a shared notion of the relevant reference system can be achieved, so much the better; but even if no agreement can be reached, understanding the way reference systems differ still represents an important gain in communicative rationality. Misunderstandings can be avoided in this way, and mutual tolerance can grow. (Note that identifying the stakeholders to be consulted represents itself a boundary judgment in need of critique, although the previous steps should provide a tentative basis).
5. Finally, when some of the parties handle their own boundary judgments uncritically, either because they take them for granted or try to impose them on others, it may become necessary to challenge their claims through the emancipatory use of Boundary Critique.

While Ulrich (2005) asserts that Critical Systems Heuristics offers guidance for each of the listed tasks, he is quick to caution that Boundary Critique is not simply a step-by-step technique for boundary setting. In other words, Boundary Critique does not propose to settle conflicts by determining which party's boundary judgements are *right* and which are *wrong;* Concluding that Boundary Critique should rather be seen as a reflective attitude as opposed to purely a technique. Ulrich (2005) moreover argues that Boundary Critique merely assists conflicting parties to appreciate both their own and others' boundary assumptions with the purpose of articulating all legitimate concerns in a cogent manner.

3.6.8 Critical Systems Heuristics

Critical Systems Heuristics draws from the critical heuristics framework of social system design proposed by Ulrich (1987). He developed his framework in answer to the conventional '*mono-logical*' understanding of rational justification where contributions of only the involved parties were considered, excluding arguments from affected individuals or groups. The intention of Critical Systems Heuristics as outlined by Ulrich (2003), seeks to establish a conceptual framework in order to systematically identify and debate boundary judgements. Critical Systems Heuristics can therefore be described as a problem solving technique supporting the practice of systematic Boundary Critique. It integrates the views and intentions of social actors (humans) into the system of concern.

The value of Critical Systems Heuristics lies therein that as a simple model for argumentation, it does not assume ideal conditions of rationality, but rather can be applied within imperfect every-day conditions of imperfect rationality (Ulrich, 2005).

Since Critical Systems Heuristics forms the complementary part to Activity Theory, a more thorough discussion is allowed to develop the framework. The salient contribution that Critical Systems Heuristics brings to this research is captured in the proposition by Reynolds (2008) that Critical Systems Heuristics provides a lens through which the essential issues of value, power, knowledge and political legitimacy can be explored within the context of organisational activity. In this research Critical Systems Heuristics as a framework, is not applied in the strict sense of the word, but is rather explored as a rich source of interrelated categories for a clearer understanding of Activity Theory and how the application of the latter framework may be enriched within the context of systems thinking. The relationship between Critical Systems Heuristics and Activity theory is discussed in Section 3.7.3.

Ulrich (2000) offers three different settings within which systematic Boundary Critique is possible, wherein each category represents a basic boundary issue in determining a proposal's system of reference:

1. Self-reflective boundary questioning: "What are my boundary judgements?"
2. Dialogical boundary questioning: "Can we agree on our boundary judgements?"
3. Controversial boundary questioning: "Don't you claim too much?"

Ulrich subsequently introduces a framework (Table 3.1) that expands and defines the applications of 'Self-reflective boundary questioning' and 'Dialogical boundary questioning' by defining twelve basic boundary problems, each corresponding to a boundary category.

> "Each category represents a basic boundary issue in determining a proposal's system of reference. There are four groups of boundary issues, concerning issues of motivation, of power, of knowledge, and of legitimation. The first category of each group refers to a social role of those involved in or those affected by, the definition of the system of concern; the second refers to a role-specific concern, and the third to a key problem in dealing with the clash of individual concerns that is characteristic of social reality. Each category requires boundary judgements in respect of both what '*is*' and what '*ought to be*' the case. Together these boundary judgements define the system of concern to which refer statements of fact or judgements of value" (Ulrich, 2000). (p10)

In his brief introduction on Critical Systems Heuristics, Ulrich (2005) explained the components and composition of Table 3.1 as follows:

The reference system that determines what observations are considered relevant when it comes to assessing the merits of a proposition, is informed by the contributions of two parties namely those involved and those affected. These parties represent two major classes of stakeholders, i.e. individuals or groups concerned by a situation based on their involvement or, although not involved, they are effectively or potentially affected. Before moving forward it is pertinent to note that any application of Critical Systems

Heuristics should be informed by the three boundary critical attitudes proposed by Ulrich (2005):

1. All problem situations, whether they be real-world or not, should be perceived through the reference system of underpinning boundary judgements.
2. Claims are henceforth to be measured by the extent to which their conditioned character is made clear to not only ourselves but also all parties concerned.
3. Boundary judgement limitations hold equally for both well-trained experts and for ordinary people, setting a stage where every individual meets as an equal with every other individual.

TABLE 3.1 TWELVE CRITICALLY-HEURISTIC BOUNDARY CATEGORIES (Ulrich, 2000)

	Boundary categories	Boundary issues		
1	Client	Sources of motivation	Those involved	The reference system (system of concern) that determines what observations (facts) and evaluations (values) are considered relevant when it comes to assessing the merits or defects of a proposition
2	Purpose			
3	Measure of Improvement			
4	Decision-maker	Sources of power		
5	Resources			
6	Decision environment			
7	Professional	Sources of knowledge		
8	Expertise			
9	Guarantee			
10	Witness	Sources of legitimation	Those affected	
11	Emancipation			
12	World view			

While the applications of 'self-reflective' and 'dialogical' boundary questioning assist with the identification and understanding of boundary judgements, social actors are not compelled by these applications to be explicit in respect of their boundary judgements. Lest this last goal should depend entirely on their goodwill, one may also employ the idea of Boundary Critique against those who are not willing to handle their boundary judgements so self-critically.

This third application is of an emancipatory nature; it provides those who may be affected by a decision but have no say in it, a means to challenge boundary judgements that are taken for granted. It is important to note that the goal of the dialogue is to increase awareness of a design's implications and not to strive towards consensual agreement between the parties (Lewis, 2007).

<u>Boundary Issues</u>: Without consideration for boundary issues, the researcher will not know what his claim means or whether it can be recognised as valid, i.e. as a basis for action. The meaning of a *claim* is hence described as: "the sum total of the consequences we expect it to have". A claim's purposefulness is described as being made up of the following four issues:

1. Sources of motivation: Where does a sense of purposefulness and value come from?
2. Sources of power: Who is in control of what is going on and is needed for success?
3. Sources of knowledge: What experience and expertise support the claim?
4. Sources of legitimation: Where does legitimacy lie?

<u>Boundary Categories</u>: Boundary categories are defined as basic types or forms of boundary judgements subject to sources of both empirical and normative selectivity that in turn necessitates critical reflection. In order for a boundary category to yield meaning, it requires an input of both empirical and normative content. Within this context a boundary category may be described as a place-holder, reminding the researcher to clarify an issue of either empirical or normative selectivity. While empirical selectively describes observations about what '*is*', normative selectivity is contained in judgements about what '*ought*' to be, the case. Since a researcher may be tempted to equate empirical selectivity with judgments of fact and normative selectivity with judgments of

value, Ulrich (2005) cautions that both types of selectivity applies equally in the selection of relevant facts as well as values. This is outlined in Table 3.2.

When considered in totality, Table 3.2 represents a reference system that endeavours to condition the investigator's perception of a problem situation, along with the claims that he makes with respect to it. When these four issues are handled in an open and transparent manner the individual or group's claims become explicit and valid.

TABLE 3.2 FOUR PERSPECTIVES FOR EXAMINING SELECTIVITY (Ulrich, 2005)

Perspective	***Empirical selectivity*** *('Is' mode)*	***Normative selectivity*** *('Ought' mode)*
'Facts'	**Actual mapping:** What 'facts' are considered relevant and which ones are left out?	**Ideal mapping:** What 'facts' ought to be considered relevant and which ones should be left out?
'Values'	**Actual mapping:** What 'values' are considered relevant and which ones are left out?	**Ideal mapping:** What 'values' ought to be considered relevant and which ones should be left out?

To each of the four boundary issues listed above, Critical Systems Heuristics assigns three categories relating to, among other things, the kind of stakeholder, concern and difficulty. These categories are explained as follows:

1. **Kind of stakeholder:** Individuals or groups who are either involved with or, while not involved, are materially affected by a specific situation. (Ulrich & Reynolds, 2010) note that Critical Systems Heuristics also supports individuals who are seen as uninvolved to uncover undisclosed boundary judgements imposed on them.
2. **Kind of concern:** This concern is associated with the stakeholder in question.
3. **Kind of difficulty:** The salient kind of difficulty that may arise regarding the concerns in question.

In an effort to facilitate the process of Boundary Critique, Ulrich (2005) suggests the transposing of each boundary category (refer to Table 3.1) into a boundary question that will elucidate the intent of the boundary category. Since both empirical and normative selectivity is considered, each category will subsequently transpose into two questions. The twenty-four boundary questions, twelve formulated in respectively the descriptive mode (*what is the case?*) and twelve in the prescriptive mode (*what should be the case?*), are listed in Table 3.3.

TABLE 3.3 CHECKLIST OF BOUNDARY QUESTIONS (Ulrich, 2000)

SOURCES OF MOTIVATION 1. Who is (ought to be) the client or beneficiary? That is, whose interests are (should be) served? 2. What is (ought to be) the purpose? That is, what are (should be) the consequences? 3. What is (ought to be) the measure of improvement or measure of success? That is, how can (should) we determine that the consequences, taken together, constitute an improvement?
SOURCES OF POWER 4. Who is (ought to be) the decision-maker? That is, who is (should be) in a position to change the measure of improvement? 5. What resources and other conditions of success are (ought to be) controlled by the decision-maker? That is, what conditions of success can (should) those involved control? 6. What conditions of success are (ought to be) part of the decision environment? That is, what conditions can (should) the decision-maker not control (e.g. from the viewpoint of those not involved)?
SOURCES OF KNOWLEDGE 7. Who is (ought to be) considered a professional or further expert? That is, who is (should be) involved as competent provider of experience and expertise? 8. What kind expertise is (ought to be) consulted? That is, what counts (should count) as relevant knowledge? 9. What or who is (ought to be) assumed to be the guarantor of success? That is, where do (should) those involved seek some guarantee that improvement will be achieved – for example, consensus among experts, the involvement of stakeholders, the experience and intuition of those involved, political support?
SOURCES OF LEGITIMATION 10. Who is (ought to be) witness to the interests of those affected but not involved? That is, who is (should be) treated as a legitimate stakeholder, and who argues (should argue) the case of those stakeholders who cannot speak for themselves, including future generations and non-human nature? 11. What secures (ought to secure) the emancipation of those affected from the premises and promises of those involved? That is, where does (should) legitimacy lie? 12. What worldview is (ought to be) determining? That is, what different visions of 'improvement' are (should be) considered, and how are they (should they be) reconciled?

Finally, it should be noted that each question has two parts. The first part (*who and what*) relates the boundary question to the referent boundary category at issue, and part two (w*hat is*) defines the intent of the boundary category. In his review of Churchman's work, Reynolds (2005) notes that the '*structural elements*' provided in Table 3.3 were originally mapped out by Churchman, and then later reworked by Churchman's student, Ulrich (2000), in terms of roles, concerns and problems, resulting in the 12 Critical Systems Heuristics questions listed in the table.

Boundary critique does not only provide a framework of enquiry against which propositions can be evaluated, it also deliberates on the issue of human intentionality driving human behaviour. Reynolds (2005) argues for a "whole system judgement" approach, enhancing understanding by enabling the right questions to be asked. This statement is supported by Ulrich & Reynolds (2010) who suggest that the application of Boundary Critique is never a bad idea since it reminds practitioners that a proper systems approach begins and ends with the questions asked, and not so much with the answers provided.

3.6.9 Summary on Systems Thinking

Flood (2010) argues that "reductionism leaves humans out of touch with their own self, other people, and indeed any sense of the human spirit." As a remedy, Reason (1994) proposes that humans may be healed from the "wretched alienation" of reductionism by adopting a systemic view.

In agreement with Zexian & Xuhui (2010) who observe that social reality is a process of never-ending change, the fixed point theorem[3] must be accepted as an ideological impossibility. This is not to say that system user wants cannot become richer in mutual understanding or that a more cohesive level of agreement may not be fostered over time, only that the emergent relationships will always remain dynamic. Appendix A provides a list of common system concepts and terms prevalent in the systems thinking literature.

[3] The Fixed Point Theorem states that there exists some point in time when everyone involved in the system knows what they want and agrees with everyone else.

3.7 Activity Theory

3.7.1 Introduction

Typical issues that are addressed by IS research include technology adoption, acceptance, and success, as well as the conditions under which these can be achieved Urbach & Ahlemann (2010). They proceed to posit that these research fields are related in that their investigation requires the researcher to cope with various similar constructs including beliefs, perceptions, motivation, attitude, or judgments of individuals involved.

Activity Theory, shown to be useful in the study of HCI (Bedny & Karwowski, 2003), finds its origins in Russian cultural psychology where the coevolution of the human agent with the world within which he is caught is recognised (Allen, Karanasios, & Slavova, 2011). The work of L. S. Vygotsky is credited by Scribner (1984) as giving birth to the framework know as Activity Theory. She subsequently notes that it was further developed by amongst others, two prominent psychologists namely A. N. Leont've who introduced the concept of activity (Allen *et al*., 2011), and J. V. Wertsch. Lewis (2007) who posits that an activity can be improved by exploring 'contractions' within the activity through the application of Activity Theory. As noted in the previous chapter, Activity Theory may be considered to be an explanatory or descriptive meta-theory, rather than a predictive theory. Furthermore, when studying digital life, Activity Theory is a particularly useful socio-constructivist conceptual tool that may be applied within qualitative research methodologies (Sam, 2012).

3.7.2 Activity Theory Framework

Within the premise of systems thinking, Kristekova *et al*. (2012) suggest that the behaviour of a system changes if the structure is changed. When applying this principle to the Activity Theory Framework, it follows that when the framework (structure) is sub-optimally organised due to existing inter-construct tensions, purposeful change to the structure to alleviate the strain will afford synergetic activity towards the achievement of the objective. Scribner (1984) describes Activity Theory as a framework within which questions may be posed regarding the relationship between cognitive processes, i.e. 'thinking', and behavioural acts, i.e. 'doing'. Xu (2007) further expands this thinking by reasoning that the Activity Theory is suitable for understanding the reciprocal effects between a user's cognitive state and manifested behaviour.

In Figure 3.6, the arrows linking the various nodes represent reciprocal tension relationships that exist dynamically within the activity environment. Allen *et al*. (2013) identify *contradiction* as the motor of change within Activity Theory, noting that contradictions threaten the very existence of the activity system as they oppose the overall aim, motive, purpose or enterprise of the system. As alluded to elsewhere in this thesis, contrary to the hypothesis of the fixed point theorem, equilibrium or stability within any system, including the activity system, is accepted as an ideological impossibility. Moreover, Allen *et al*. (2013) and Levins (1998) argue that, similar to feedback in Systems Theory, contradiction assumes the role of driving change within Activity Theory.

Viewing the framework from a systems thinking perspective it stands to reason that any change, i.e. a relaxation or intensification of a particular tension relationship, will warp the entire framework thereby introducing strain on the activity objective and subsequent goal achievement.

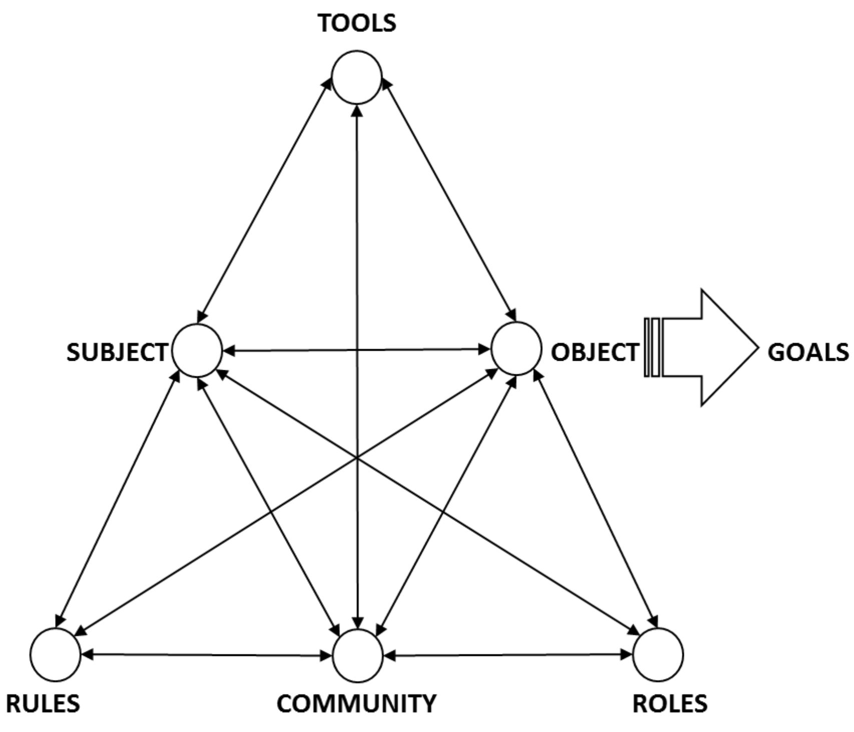


FIGURE 3.6 ACTIVITY THEORY FRAMEWORK – ADOPTED FROM (LEWIS, 2007)

While the Activity Theory Framework is accepted to be made up of the parts of dialectical wholes, these parts are not considered to be as independent as possible from the whole (framework) but rather as points where properties of the whole are concentrated (Levins, 1998).

While the focus is placed on the activity, Activity Theory provides a contextual framework within which a particular activity may be understood to be a goal (enhanced organisational value), directed or purposeful interaction of a subject (end-user) with an object (value conservation objective) through the use of a tool (i.e. IS). Furthermore, each node is understood to be an instrument that both mediates and controls the subject's activities (Allen *et al*., 2011). For example, when the subject (end-user) utilises a tool (i.e. IS) to achieve and objective (create or sustain business value), the IS (i.e. tool) not only empowers the user to perform at a much higher level of productivity, but also limits the user's actions subject to the tool's functionality. An explication of each of the nodes in the Activity Theory framework is considered below, contextualised within the environment of the present research endeavour.

<u>Tools</u>: Physical objects and systems of symbols that are used by actors (employees) to accomplish a particular work activity. For this study the IS artefact will be defined as the tool used by subjects to accomplish specific tasks. The IS tool is considered within the context of the Technology-to-Performance Chain model, which asserts that in order for technology to have a positive impact on a user's performance, alignment between the characteristics of the task that the subject has to perform, and the technology tool needs to exist. From the framework it is evident that while the subject has a direct link to the object, there also exists an indirect mediatory link via the tools component. As noted, the tools component may both empower the subject in his efforts to achieve a particular objective and/or restrict his efforts in the achievement of a specific objective for which the tool is unsuitable. Moreover, the agent may also misuse the tool (unintentionally or intentionally) thereby creating tension between the tool and the objective, resulting in potential value dissipation.

Subject: The person or people engaged in the activity, and who comprise the focus of this study on activity. The end-user's point of view is considered in the focus on the activity behaviour of the employee. Bedny & Karwowski (2003) note that the job performance of the end-user is subject to, among other things, individual features of personality, educational background, motivation, needs and desires, wishes, and the background and training of the user in the use of IS. It is also within the relationship between the subject and the tools that the Lazy User Behaviour Theory suggests that users of IS will most often pursue a course of action that will require the least effort to achieve a desired outcome. Moreover, it is within the tools-subject relationship that system misuse or abuse is recognised, as a number of *improper* activities take place while the user is *stationary* in front of a computer (Sam, 2012). She further notes that Activity Theory is flexible in that it can be applied to an individual agent or expanded to include numerous agents working towards a common goal. For purposes of this research, the subject is defined as an individual agent who is a member of a virtual community of IS users, who collectively contribute towards the creation and/or destruction of organisational value.

Rules: The rules are understood to be laws or professional codes, organisational or discipline specific conventions as well as customs and agreements which individuals adhere to while engaged in a particular activity. In line with the Theory of Reasoned Action model, an end-user's norms may be directly or indirectly influenced and shaped by a number of individuals or groups within his social and/or work environments. Norms define the boundaries for acceptable behaviour within a particular group setting and context by implicitly inferring or explicitly declaring normal and acceptable behaviour (Burnett & Bonnici, 2003). As noted previously, subjective norm is defined as an individual's perception of whether most individuals, who are important to him, would approve of certain behaviour or not. Within virtual communities, policies include those socially constituted and ever changing rules, regulations, norms and conventions that are made explicit within the terms and conditions of the community or enforced implicitly by members of the community (Allen *et al*., 2011; Burnett & Bonnici, 2003; Burnett, Dickey, Kazmer, & Chudoba, 2003).

Community: The individuals and groups whose knowledge, interests, stakes, and goals shape the activity, are demarcated as the IS user's direct peers, i.e. line management, executive management, system support units, and customers (i.e. individuals or groups reliant on the user's activity based deliverables). Customers may be external to the firm or placed internally within other divisions. The employee may also be affiliated with, and influenced by, a particular professional, social or religious community that transcends the precincts of his organisational or demographic community.

Roles: Bedny & Karwowski (2003) underscore the need to give attention to the social context within which a task is performed, including the social dynamics of the group responsible for job performance. The roles or division of labour node describes how the work required, when performing a particular activity, is divided among participants in the activity. Within the division of roles, the principal-agent problem describes the challenges that the principal (line manager) faces when endeavouring to motivate a self-interested agent (system user) to act in the best interests of the principal rather than in his own interests, when making use of the organisation's IS.

Object: The object represented in the framework closely relates to the underlying objective implied within the problematic scenario described by the productivity paradox, namely to create optimal business value through the adoption and use of information technology. To this point Allen *et al*. (2013) draw attention to the peculiarity that objects have a life of their own, which becomes evident in their resistance to attempts by subjects to control them. Object and motive, i.e. the motivation for the activity, provide the backdrop for a clearer understanding of the context within which the activity takes place as a dynamic and changing environmental variable (Allen *et al*., 2011).

Goal: If the objective is achieved, the goal component of the organisation, within the context of this study, is reached namely the realisation of innovated organisational value. Innovated value is realised within a value conservation context where value is both actively conserved and value dissipation purposefully minimised through specific adjustments to the adoption and usage of an IS by an end-user.

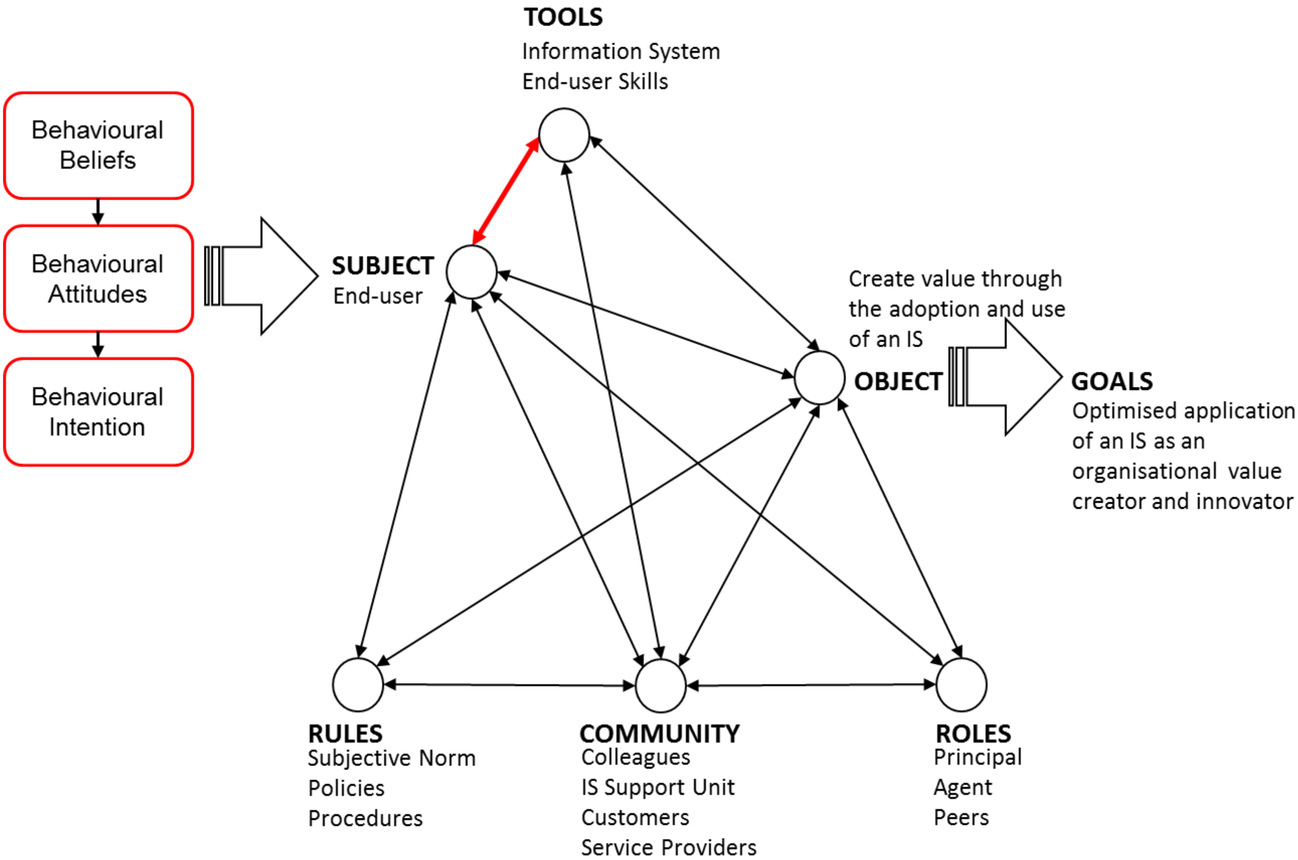


FIGURE 3.7 ADJUSTED ACTIVITY THEORY FRAMEWORK: SUBJECT-TOOL CONTRADICTION CAUSING ACTIVITY INSTABILITY (ADAPTED BY AUTHOR)

Figure 3.7 provides a graphic example of a situation where the technology tool is inadequate to realise the requirements of a particular activity which the user is attempting to perform. The subsequent contradiction creates tension between the two components which in turn distorts the framework triggering tensions throughout the interlinked lattice, rendering it suboptimal and unable to efficaciously achieve a particular activity dependant objective. The tension produces a new object, namely to remove the tension in the framework, before activity towards the original object can be reassumed. Sam (2012) argues for the use of Activity Theory as a tool or a means to an end, to improve upon or reshape interactions, thereby designing more optimal activities, which may contribute towards the accomplishment of enhanced outcomes.

Allen *et al*. (2013) make explicit the difference between primary contradictions, i.e. those inherent within a component of the activity (e.g. rules, norms, object etc.) and secondary contradictions, i.e. those that exist between nodal constitutes of the framework (e.g. between the subject and the IS mediating tool). While the researcher is focused on resolving tensions/contradictions within a node or between nodes, it must ever be kept in mind that Activity Theory is dynamic in the sense that it recognises the constant change of activities, actions and operations with the passing of time. Allen *et al*. (2011) attribute this constant development of activity, to not only the contradictions, tensions and instability in the activity system, but also argues it to be a product of the systemic needs of the community and subjects.

The graphical representation of the activity system in Figure 3.7 illustrates a subject (end-user), driven by a motivation to achieve an object (create or destroy organisational value), who undertakes an activity (action certain computer instructions which may be work related or of a personal nature). This process is mediated by tools (inclusive IS) and signs (computer instructions, i.e. skills, and knowledge, i.e. understanding) in collaboration with the community (co-workers, i.e. peers, subordinates, line managers, and end-supporters, i.e. the IT support department). While tools refer to physical artefacts, signs refer to language, skills, memory etc. Allen *et al*. (2011) observe that the label tools is almost exclusively used in the literature to refer to both physical artefacts and signs. The activity process, which contains an element of value (positive or negative), finds expression against the backdrop of community, rules and behavioural norms (as described elsewhere in this thesis) and a division of labour (i.e. roles) as described within the context of Activity Theory.

3.7.3 Summary

Lewis (2007) notes that Activity Theory focuses on the roles of tools (e.g. IS) and community (e.g. IS support unit, colleagues, customers, and service providers) to formerly construct a framework within which organisational activities can be understood, and more specifically the relationships between IS and business activities. He further notes that Critical Systems Heuristics complements Activity Theory as it encourages the design of systems where individuals' respective contributions are considered both within the context of their involvement with the system and the system impacting on their environment. Ulrich & Reynolds (2010) introduce Critical Systems Heuristics as a complementary method that may be used in combination with other methodologies, providing a common language for reflective practice across different professions and methodologies. They further argue that Critical Systems Heuristics may support professional intervention by either evaluating the intervention or by informing the methodologies utilised for the intervention.

Lewis (2007) concludes that the Activity Theory-Critical Systems Heuristics framework derives its core strength from the major role it attributes to human intentionality. Moreover, Allen *et al*. (2011) argue that Activity Theory allows the researcher to understand information behaviour within the context of human motive where the context, viewed from a cultural-historical perspective, is described as both the legacy of past activities and a determinant of present activities.

The study now transfers the focus of the discussion towards the research method which incorporates the framework of Activity Theory supported by Critical Systems Heuristics.

3.8 QUALITATIVE DATA

3.8.1 Qualitative Data Collection

The primary data collection process was introduced by holding interview discussions with a number of employees at a major South African financial institution. Participants were contacted either telephonically or directly face-to-face to request their participation in the research. Interviews were confirmed with assenting respondents via email. The majority of participants were selected from within the executive and senior manager cadre of seniority. Each participant was presented with a copy of the questions for discussion (Appendix G) and background context to the interview questions (Appendix H). The flow delineated in Appendix H (providing a logical link to the Theoretical Technology Value Framework in Figure 2.13), was explained to participants, if required, without any attempt to prejudice them towards accepting the model or any component thereof. Interviews were conducted with 31 individuals operating within the disciplines of information technology, business operations and organisational development.

Participants approached to take part in the interview discussion processes, were classified against the four sources of influence (provided by the respective categories of stakeholders) as follow:

1. **Sources of Motivation:** Business executives who are the intended clients/beneficiaries of the existing or new IS.
2. **Sources of Control/Power:** The Information Technology executives who are the decision makers on the existing or new IS.
3. **Sources of Knowledge:** Business and Information Technology professionals/experts, who work in squads as experts to design, develop, test and support the IS.
4. **Sources of Legitimacy:** Both internal users and external customers of the financial institution who witness, i.e. are effected by the system but do not contribute to the design or operation of the IS, fall within this class.

Within the context of Critical Systems Heuristics, the boundaries of a social system can be explored by investigating four different groups of stakeholders. The 31 participants who took part in the interview discussions may be classed as follow:

1. **Sources of Motivation:** Clients/beneficiaries - 4
2. **Sources of Control/Power:** Decision makers - 9
3. **Sources of Knowledge:** Professionals/experts - 8
4. **Sources of Legitimacy:** Witnesses - 10

Interviews were conducted in the form of a discussion where participants were granted an opportunity to lead the discussion within the framework of the Theoretical Technology Value Framework. Critique on the Framework was welcomed by the author. During the interviewing process the interviewer was committed to ensure that the components of perspective and selectivity underlying Critical Systems Heuristics were incorporated into the interview questions and resulting discussions. Participants were pressed to clarify issues of either empirical or normative selectivity. As noted elsewhere, empirical selectively describes observations about the existing '*as is situation*', whereas normative selectivity is enclosed in judgements about '*what the situation ought to be*'. Both empirical selectively and normative selectivity was applied equally in the selection of relevant facts as well as values. Interviews typically lasted from 30 to 90 minutes in which participants were requested to deliberate on the following six questions:

1. Do you agree that the introduction of an IS may not only create value for an organisation but may also inadvertently dissipate value? Why, why not?
2. Do you think the four behaviours are valid value dissipating drivers in an organisation?
   i. Unintentional misuse of IS
   ii. Passive Disuse of IS
   iii. Active Abuse of IS
   iv. Intentional Sabotage of IS
3. Which of the following end-user attributes have the greatest influence on each of the four behaviours?
   i. Employees’ Beliefs
   ii. Employees’ Attitudes
   iii. Employees’ Intentions
4. Rank the above four behaviours (in question 2) from the behaviour that has the most potential to dissipate value to the one that has the least potential to dissipate value. Please motivate your ranking.
5. How do you think the four behaviours influence, cause, reinforce or moderate each other?
6. How can the value eroding impact caused by end-users in your organisation be minimised?
   - Consider the establishment of control measures to minimise the four behaviours.
   - Consider the institution of value leadership to influence end-user’s beliefs, attitudes, and intentions towards the use of IS.

While interviews provided depth to the phenomenon under investigation, ensuing questionnaires provided both breadth to the study and confirmation of the interview results. It is important to note that Question 6 was intentionally placed last so as not to prejudice the response from the participants.

The precedence of qualitative data collection was chosen with the intent to firstly explore the problem under study followed by the collection of quantitative data that are amenable to studying a larger sample in order for the results to be inferred to a broader IS user population (Creswell *et al*., 2003). The purpose of conducting open-ended interviews was to validate, and where necessary adapt, the proposed Theoretical Technology Value Framework (Figure 2.13). Questions posed during the interview process were informed by the principles of Critical Systems Heuristics, i.e. boundary categories and boundary conditions. The objective of the interviewing process was the establishment of a representative Technology Value Model that both informed the content of the questionnaires and could be validated with the output from the questionnaires towards the development of an empirically validated Adjusted Technology Value Model.

All interviews constituted pre-arranged dialogues with senior employees within the organisation. Interviews took place at the respective corporate head office buildings of the financial institution. This assisted in the preservation of the business environment and the conservation of business language. The location also presented the author with an opportunity to observe the working environment of the respondents. Interviews were digitally recorded and hand written notes made. Attention was given to the physical surroundings of the participants' offices, among other things office layout, atmosphere and any interactions with colleagues.

The semi-structured interviews followed by the context to the interview questions (provided to participants preceding the interviews and explained prior to the commencement of each interview if the participant so requested) are attached in Appendices G and H. The open ended questions were derived from the literature review conclusion and findings. Participants were provided sufficient freedom to digress from the listed questions to relevant topics that the author had not thought of previously. These digressions often added a level of richness to the interview process that would otherwise not have been obtained if the interviews had followed a purely structured approach. Interviews are purported to provide the best opportunity for respondents to share information in a comfortable and familiar manner (Creswell, 2014). The advantages of semi-structured interviews include its allowance for an adaptive quality and the freedom it provides for the author to explore interesting insights that may arise. The disadvantage (especially since the author is also an employee at the firm) was that respondents may have had concerns regarding confidentiality resulting in the subsequent reluctance to share incriminating opinions regarding corporate culture or personal recalcitrant behaviour.

Details of the 31 interviews are listed in Appendix I. Transcripts of the interviews are available from the author.

3.8.2 Qualitative Data Analysis Process

Atlas.ti was utilised to code and analyse the data from the interviews. The data analysis procedure followed the data management system prescribed by Miles & Huberman (1984). It comprised three interlinked sub-processes, namely: data reduction, data display, and conclusion drawing/verification.

During the initial data reduction process, the transcripts from the digitally recorded interviews were condensed into specific data summaries for analysis. Next, a code book and coding was applied to categorically identify key terms and themes presented across the various interviews. Following on from the coding process, specific differences and inconsistencies were identified and highlighted. Where discrepancies were found in the feedback, the viewpoints of the respective participants were weighed against the context of the overall feedback from all the participants on the particular topic under contention. A descriptive content analysis method, as described by Neuendorf (2002), was applied to extract themes and contradictions within the data. Finally, the reduced set of data was displayed using text-based matrices to assist in the interpretation process (Miles & Huberman, 1984).

The drawing of conclusions and derivation of meaning from the data, included compare-and-contrast analysis as well as the identification and explication of patterns and trends. Verification of these conclusions was ensured by re-contacting a number of participants and confirming the validity of the results. Triangulation with alternative data sources (questionnaires and rating & agreement scales) also provided verification of key findings in the study (Miles & Huberman, 1984).

3.9 Quantitative Data

3.9.1 Quantitative Data Collection

Questionnaires, incorporating rating & agreement scales were utilised in the collection of contextual end-user system usage data. Questions were based on key themes identified within the feedback obtained from the original interviews. As previously suggested, the purpose of introducing rating & agreement scales were twofold: Firstly, the focus of the investigation was thus refined towards more relevant themes and secondly, the feedback from the interviews could be validated by matching the results with that of the questionnaires.

Due to its distinctive and relatively complex nature, the Theoretical Technology Value Framework could not be verified through existing questionnaires from the literature. Since the latter proved inadequate, the author was compelled to formulate a set of questions that were particularly relevant to the specific constructs, including their concomitant interrelationships.

3.9.2 Questionnaires

The objective of the questionnaires was to validate, and where necessary modify, the proposed Theoretical Technology Value Framework towards an empirically validated Adjusted Technology Value Model. Commenting on the stage of integration, Creswell *et al*. (2003) note that integration may occur within the research questions, i.e. in questionnaires where both qualitative and quantitative questions are presented.

Chen, Sharman, Rao, & Upadhyaya (2013) propose the deployment of Activity Theory as a mechanism to conform data values to business requirements and acceptance criteria. Questions listed within the questionnaires were subsequently informed by the principles of Activity Theory, i.e. Activity Theory was employed to describe and explain the value eroding interaction between end-users and IS within the context of the Theoretical Technology Value Framework. The objective of the questionnaire process was the establishment of a representative Technology Value Model that will both inform the content of the rating & agreement scales and can be validated against the output from the rating & agreement scales towards the development of an empirically validated Technology Value Model.

Taking the activity as a unit of analysis the author constructed the activity system as if looking at it from above. At the same time the author selected multiple members of the local activity, through whose eyes and interpretations the activity is constructed (Allen *et al*., 2011).

While the use of existing instruments provide cost and time saving advantages (Mouton, 2001), the author could not find suitable instruments in the literature reviewed, primarily due to the uniqueness of the posited relationships between the constructs within the value model, that needed to be validated. Mouton (2001) cautions researchers, who embark on the development of new instruments, to consider the following 11 sources of error in their development of questionnaire/scale construction:

1. **No piloting or pre-testing is done:** The questionnaire was tested, as noted previously, by four independent respondents and problems were resolved before the main sample were requested to complete it.
2. **Ambiguous of vague items:** The overall feedback from the four pilot respondents, regarding the clarity of questions, was repeatedly positive.
3. **Double-barrelled questions:** Care was taken to ask one distinct question and not conflate two sub-questions into one.
4. **Item order effects:** The author ensured that questions/items followed logically along with the flow of cause and affect paths in the value model. While the order of question groups were organised to reflect the flow within the value model, the various questions within a specific group which needed to factor onto a construct, were randomised. The question randomiser was set in the evaluation tool against every set of corresponding questions.
5. **Fictitious constructs:** All constructs contained within the value model, were derived from the literature and confirmed through the preceding qualitative process.
6. **Leading questions:** Questions were posed in a clear and neutral manner so as not to lead or mislead the respondents in applying subconscious bias when answering it.

7. **Negatively phrased questions or double negatives:** The syntactic structure of each question was carefully reviewed to ensure negatively phrased items were aligned to positively phrased items; e.g. the following two questions factor onto the same construct even though the second is negatively phrased. *(a) "The computer systems of the organisation are easy to use"* vs. *(b) The computer systems of the organisation are not difficult to use"*.
8. **Poor and confusing layout of the questionnaire:** The questionnaire was logically structured and themes flowed intuitively from one question group to another.
9. **Instruments that are too long:** The salient drawback of the questionnaire is its length. The complexity of the value model necessitated the development of the 100 questions, while the remaining eight questions related to demographic information. With the total of 108 questions, the completion of the questionnaire proved to be too daunting for most of the respondents who initially started to complete the form. The metadata generated by the survey tool, is discussed in the next section.
10. **Sensitive or threatening questions:** Due to the author's need to determine to what extend IS were being abused by end-users, it was necessary to pose questions to respondents regarding their private (negative) behaviour when using IS.
11. **Avoid mono-operational bias:** Where possible constructs were not measured with the use of only single items/questions, scales were constructed where ever possible.

Following on from Mouton (2001), Van Biljon (2011) defines a questionnaire as "*a purposely defined, structured and well-written set of questions to which an individual is asked to respond.*" Van Biljon (2011) and Willis (2005) moreover note that questionnaire design is further influenced by issues of question order, content and format, considered as follows:

1. **Question order:** Care was taken when designing questionnaires to ensure that earlier questions did not contort responses to ensuing questions. This was accomplished through the following rules: Firstly, questions moved from general to specific questions on the topic. Secondly, behaviour questions were posed before attitudinal questions when related to the same subject. Thirdly, the prompting or priming of respondents was

avoided by locking them into a course of responses leading to a conclusion that can only be answered in one way if the respondents are to appear consistent. Fourthly, use was made of funnelling sequences to move respondents from general to specific questions, eliminating the problem of earlier questions distorting responses to ensuing questions. Fifthly, the order of alternatives listed may have an effect on their selection. This is mainly due to respectively the primacy effect, i.e. respondents' tendency to give more weight to the first mentioned alternative, and the recentness effect, i.e. respondents' propensity towards selecting the last alternative in the list. This problem was partly moderated by rotating or randomising the listed alternatives.

2. **Question content:** The following was considered when the author composed the questions and decided on the language to be used to phrase the questions: Firstly, it was ensured that: the wording was brief, precise, unbiased, clear and objective. Secondly, double barrel (ambiguous) questions were decomposed into two specific questions. Thirdly, all potential double negatives phrases were removed when asking respondents to agree, or not to agree, to a question. Lastly, the author ensured that all questions were structured within the ambit of sensitivity and the acceptable ethical research practices.
3. **Question response formats:** Response formats may be divided into open-ended (open response) and close-ended (fixed) response formats. The former format, not utilised in the research questionnaires, creates an opportunity for the creation of a new response, i.e. the solicitation of novel information. The latter incorporated responses from rating & agreement scales, as both scales are structured as a series of finite choices. These fixed formats are especially useful when the statistical analysis of data is desired.

3.9.3 Quantitative Data Analysis Process

The quantitative data collected via the feedback from the 399 respondents who completed the questionnaire was statistically analysed using both *Statistical Packages for Social Sciences (SPSS)* version 23 and SAS JMP version 12 as follows:

Validity: The validity of the theoretical constructs, informed by the Theoretical Technology Value Framework was tested. The process applied Exploratory Factor

Analysis (EFA) to statistically test the loading of responses (items) on each of the constructs[4] (factors). This determined the number of valid factors that may be included within the model.

Validity was firstly established by applying the Kaiser-Meyer-Olkin (Kaiser-Meyer-Olkin) Measure of Sampling Adequacy. The Kaiser-Meyer-Olkin measure varies between 0 and 1, where values closer to 1 are better and the Kaiser-Meyer-Olkin measure is required to be >> 0.500. Moreover, a value of 0.6 is a suggested minimum.

Secondly, Bartlett's Test of Sphericity, i.e. the approx. Chi-Square, *df* and Significance was determined. It tests the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is composed of a matrix where all of the diagonal elements are 1 and all off-diagonal elements are 0. The null hypothesis needs to be rejected in order for the matrix to be verified as valid.

Taken together, these tests provide a minimum standard which should be passed before a factor analysis (or a principal components analysis) is conducted. While Principal Axis Factoring will be applied as the preferred extraction method, the rotation method that will be chosen is Oblimin with Kaiser Normalization.

Reliability: Once the number of factors was established that will be statistically measured going forward, each factor was refined by testing all the items (statements) that loaded highly onto the particular factor for reliability. Reliability was tested via item analysis i.e. the internal consistency of each factor was established by demonstrating that each item loading onto the particular factor, measures only the specified factor and not some other factor as well. A Cronbach's Alpha of ≥ 0.8 was accepted as an indication of good reliability (Cronbach, 1951).

Correlation: Due to the anticipated complexity of the Adjusted Technology Value Model, a process of exploratory analysis was employed to identify correlating patterns within the data. Gosling (1995) describes correlation analysis as useful in the solving of problems where the interrelatedness of two or more simultaneous variables is

[4] Constructs is also referred to in the literature as factors, components, dimensions, or concepts.

considered. Moreover, the goal of the analysis is to determine if evidence can be obtained as prove the existence of significant relationships between multiple variables.

Spearman's rank correlation coefficient (Spearman's rho) provides a measure of statistical dependence between two variables (Spearman, 1904). It assesses how well the relationship between two variables can be described using a monotonic function. A monotonic function may be understood as a function that either never increases or never decreases as the independent variable increases. If there are no repeated data values, a perfect Spearman correlation of +1 or −1 occurs when each of the variables is a perfect monotone function of the other. Since correlation is an effect size, the strength of the correlations will be described by using the following guide for the absolute value of Spearman's rho:

1. 0.00 – 0.19 Very weak
2. 0.20 – 0.39 Weak
3. 0.40 – 0.59 Moderate
4. 0.60 – 0.79 Strong
5. 0.80 – 1.00 Very strong

The calculation of Spearman's correlation coefficient, and subsequent significance testing, requires that the following data assumptions hold: interval or ratio level or ordinal monotonically related. Unlike Pearson's correlation, there is no requirement of normality and hence it is a nonparametric statistic.

Regression: Once the significance of the correlations coefficients between each of the constructs were calculated, regression analysis was performed, placing specific focus on highly correlated factors. Gosling (1995) describes regression analysis as the process where a particular unknown variable, i.e. latent variable, of interest is predicted by analysing a number of known variables, i.e. indicator variables. Regression analysis establishes the relationship between a dependent variable (criterion variable) and a number of independent variables (predictors). The purpose of the analysis is to evaluate changes in the value of the dependent variable when a particular independent variable is varied, while keeping the remaining independent variables fixed. Each independent variable statistically competes against the residual independent variables to establish a significant relationship with the dependent variable.

Structural Equation Model: All factors were tested *simultaneously* against all other factors in a Confirmatory Factor Analysis process. Where significant relationships are established, the Theoretical Technology Value Framework is relied on to designate causation between particular constructs.

3.9.4 Introduction to Structural Equation Modelling

Hoyle (1995) considers Structural Equation Modelling to be a comprehensive approach to testing hypotheses about relations among both observed and latent variables. More formally, Structural Equation Modelling may be defined as a: "Multivariate technique combining aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts with multiple variables) to estimate a series of interrelated dependence relationships simultaneously" (Gefen, Straub, & Boudreau, 2000). (p72). Structural Equation Modelling encapsulates models that incorporate latent variables, measurement errors in both dependent and independent variables, multiple indicators, reciprocal causation, simultaneity and interdependence (Marcoulides & Schumacker, 1996).

While (Gefen, Rigdon, & Straub, 2011) note that there is a proliferation of Structural Equation Modelling methods applied within IS research, Suhr (2006) cautions that Structural Equation Modelling does not offer a test of causality. However, (Bentler, 1980) holds that the causal structure can be considered plausible if the model cannot be statistically rejected.

Urbach & Ahlemann (2010) stress the importance of realising that deciding on a philosophical position should not be an arbitrary exercise as it has a significant impact on the research design and the nature of the insights that the researcher can acquire. Moreover, they note that scholars recommend not using different research methods with conflicting underlying philosophical assumptions. Although recent voices favour a differentiated perspective on this incommensurability thesis, researchers need to carefully analyse whether their multi-methods approach may lead to severe ontological or epistemological problems (Mingers, 2001).

Urbach & Ahlemann (2010) position research initiatives that apply Structural Equation Modelling within the grouping of positivist epistemological beliefs. From an ontological perspective, they suggest that Structural Equation Modelling must subsequently assume an objective, physical, and social world that, while existing independently of humans, is easily apprehended, characterized, and measured.

Contrary to the interviewing process, the author played a passive, neutral role during the quantitative process taking care not to intervene in the phenomenon under investigation. Moreover, in contrast to the former interpretive philosophical position adopted during the interview stage, the author could now objectively evaluate or predict actions or processes, while abstaining from becoming involved in moral judgments or subjective opinions.

The importance of the Structural Equation Modelling technique stems from its ability to provide powerful ways of addressing IS research problems among other things explicating IT usage (Chin & Todd, 1995). Suhr (2006) defines Structural Equation Modelling as a methodology for representing, estimating, and testing a network of relationships between variables, both measured variables and latent constructs. Iacobucci (2010) further recommends that Structural Equation Modelling be used more frequently among academics and in industries wherever practitioners espouse conceptual models. Structural Equation Modelling is understood to represent a hybrid between a form of analysis of variance/ regression and a form of factor analysis. Structural Equation Modelling is accepted as a statistical technique for the testing and estimating of causal relationships based on statistical data and qualitative causal assumptions (Urbach & Ahlemann, 2010).

Lundqvist (2014) notes that the purpose of factor analysis is to reveal any latent variables that cause the dimensions to covary. Scholars have long since recognised that many research investigations incorporate elements of both exploratory and confirmatory factor analysis, since both known and unknown variables are built into the

Structural Equation Modelling (Anderson & Gerbing, 1988). Rather than viewing exploratory and confirmatory (restricted) analysis as a strict dichotomy, the distinction in practice between exploratory and confirmatory analysis should rather be thought of as an ordered progression. Factor analysis may be applied to illustrate this progression (Anderson & Gerbing, 1988).

Structural Equation Modelling requires model specification to be based on both theory and research and subsequently requires researchers to support hypothesis with theory or research and specify relations *a priori* (Suhr, 2006). Moreover, since a model or diagram must allow for the specification of relationships between variables, the Theoretical Technology Value Framework, informed by the literature, is presented in Figure 2.13 as a visual delineation of the construct relationships identified within the first two chapters of this thesis, is proposed.

It must be noted that the proposed relationships between constructs do not exhaust all possibilities but only include relationships that were considered plausible.

While the parameter values of the proposed Theoretical Technology Value Framework are to be freely estimated, Anderson & Gerbing (1988) require a measurement model, as shown in Figure 2.13, to be specified *a priori*. They moreover describe confirmatory analysis in a more descriptive term namely restricted analysis; since the values for a number of the parameters have been restricted *a priori*, typically to zero. Appendix C provides a list of common system concepts, terms and rules prevalent in the Structural Equation Modelling thinking literature.

3.10 ETHICAL CONSIDERATIONS

This study was conducted within the requirements of the University of South Africa's ethical policy and individuals' right to privacy. An ethical clearance certificate, authorising the particular research documented in the thesis, was issued by the University of South Africa, and is attached hereto in Appendix D.

The salient ethical concern in this study is that of participant anonymity, especially in cases where feedback from participants could discredit, incriminate or limit potential career advancement prospects of individuals or produce a reputational or strategic risk to the organisation. Written and signed approval to conduct research within the particular financial institution was obtained from a Division Executive reporting directly to the organisation's Chief Information Officer. Informed permission criteria are listed in Appendix E.

Instances where interviews were conducted with individuals, participants were verbally requested to provide signed consent for the interviews to be transcribed and subsequently coded for academic research purposes. Participants were moreover assured that any and all feedback would be held in the strictest confidence so as not to identify and, in so doing, associate any particular person with a particular discussion.

3.11 Limitations of the Methods

Limitations relating to the adopted methodology (i.e. mixed methods research), describe the limitations of the research and what the implications are. For example, the study was reliant upon the availability of a relatively large sample of individuals. Although participant agreement to contribute towards the qualitative component was attained, interview cancellations and postponements were a distinct reality. Every effort was made to ensure that candidates honoured their agreements. Also, respondents who completed questionnaires and rating & agreement scales did not always complete all the questions or may have, within their subjective ontological perception of the world and their current employment circumstances intentionally or unintentionally, provided a distorted view of reality. This said, the feedback from the 399 respondents, who completed the questionnaires, proved sufficient to place reliance on quantitative findings supporting the author's efforts to assess strategy formation in a numeric framework.

3.12 Reliability and Validity

During the selection of research instruments and tools the criteria of reliability, relevance and validity was considered. Bhattacherjee (2012) holds that the adequacy and accuracy of measurement procedures are gauged within scientific research by the elements of reliability and validity, jointly called the "psychometric properties" of measurement scales. He goes on to graphically depict the difference and relationship between validity and reliability as shown in Figure 3.8.

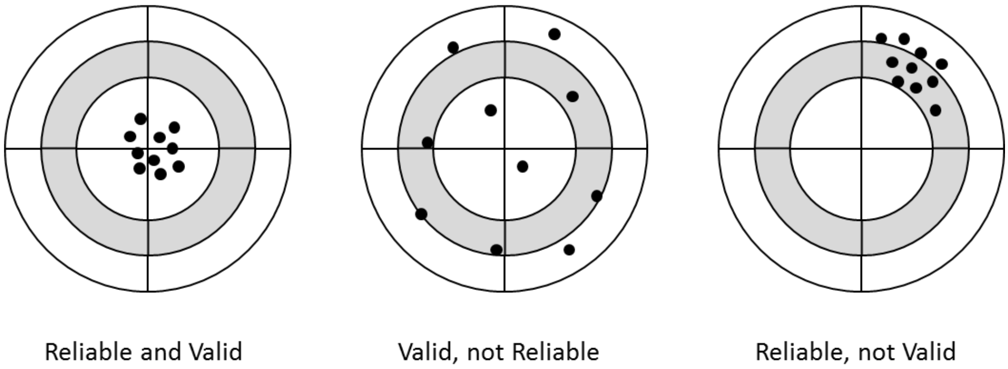


FIGURE 3.8 COMPARISON OF RELIABILITY AND VALIDITY (BHATTACHERJEE, 2012)

In a broad sense, validity is the extent to which a method (i.e., the design, the model, or the construct) measures what it claims to measure. Consideration was given to the affects that unobserved heterogeneity has on the four major types of validity i.e. internal, instrumental (including content, construct, and criterion validity and reliability), statistical conclusion, and external validity (Becker, Rai, Ringle, & Völckner, 2013; Heeler & Ray, 1972; Onwuegbuzie & Johnson, 2006; Straub, 1989). In their discussion on unobserved heterogeneity in Structural Equation Modelling, (Becker *et al*., 2013) highlight the implications of unobserved heterogeneity for model validity as summarised in Table 3.4.

Table 3.4 Implications of Unobserved Heterogeneity for Model Validity (Becker *et al.*, 2013)

<table>
<tr><th colspan="2">Type of Validity</th><th>What is It?</th><th>Threats Due to Unobserved Heterogeneity</th></tr>
<tr><td colspan="2">Internal Validity</td><td>Is the effect due to unhypothesized variables?
Are there rival explanations for the findings or just one single explanation?</td><td>There are other viable explanations for the findings, namely group differences that are not accounted for.</td></tr>
<tr><td rowspan="4">Instrumental Validity</td><td>Content Validity</td><td>Do the indicators accurately reflect the theoretical domain?</td><td><u>Formative & Reflective</u>
In general, heterogeneity does not affect content validity, as content validity is grounded in theory.
<u>Formative</u>
The error term of the formative construct likely increases due to unobserved heterogeneity, which can be mistakenly interpreted as lack of content validity (Type II Error).</td></tr>
<tr><td>Construct Validity</td><td>Are the chosen measures representing the true construct of the phenomenon?
Are the operationalisations of the constructs correct?</td><td><u>Formative & Reflective</u>
Indicator weights/loadings estimated with the assumption that no underlying groups exist are biased if groups actually exist.</td></tr>
<tr><td>Criterion Validity</td><td>Are inferences from the construct to a related behavioural criterion of interest accurate?</td><td><u>Formative & Reflective</u>
Differences in construct perceptions across groups (i.e., different weights/ loadings) lead to biased construct scores, which, in turn, influence (bias) the estimated relationship with other constructs.</td></tr>
<tr><td>Reliability</td><td>Are the measures accurate?
Are the measures consistent?</td><td><u>Test-Retest Reliability (Formative & Reflective)</u>
Not affected
<u>Internal Consistency (Reflective)</u>
Reliability (e.g., Cronbach's alpha) at the overall sample level is negatively influenced by the lack of ME/I across groups.</td></tr>
<tr><td colspan="2">Statistical Conclusion Validity</td><td>Have adequate sampling procedures, appropriate statistical tests, and reliable measurements been used?</td><td>Heterogeneous samples may lead to higher standard errors or lower effect sizes, thereby influencing the power of tests.
Biased estimates, Type I, and Type II errors.</td></tr>
<tr><td colspan="2">External Validity</td><td>Are findings generalizable to other populations and conditions?</td><td>Interpretations of the overall sample may be ambiguous and misleading.
Results cannot be generalized easily, as they are valid for only a special condition of the model.</td></tr>
</table>

3.12.1 Reliability

Reliability describes the extent to which the instrument produces results which are consistent, i.e. the same results on repeated trials under the same conditions

(Neuendorf, 2002). Since a more refined exposition of reliability is required within the context of qualitative research, attention was devoted to the elements of ‘rigour’, ‘trustworthiness’ and ‘defensibility’ as prescribed in the pursuit of reliability for qualitative studies (Golafshani, 2003). Reliability was assured by following a process where the accuracy of the research instrument was iteratively refined. This was done by testing the instruments on referent trial respondent groups prior to the introduction of the instruments within the selected research sample. Refinements and clarifications were made to the test instruments to ensure the elicitation of appropriate data from the research respondents.

3.12.2 Relevance

Relevance refers to the requirement that research instruments are applicable to the intended context of use as discussed in Sections 3.8 and 3.9.

3.12.3 Internal Validity

Onwuegbuzie & Johnson (2006) suggest that for mixed methods research discussions about validity issues are yet in their infancy. They further argue that assessing the validity of findings is particularly complex since mixed research involves combining complementary strengths and non-overlapping weaknesses of both quantitative and qualitative research.

Internal validity ensures the data collection process is uniform throughout. Validity is defined as: “*The extent to which an empirical measure adequately reflects what humans agree to be the real meaning of a concept*” (Neuendorf, 2002). In asking the question: “*Are we really measuring what we want to measure?*” Van Biljon (2011) further expounds this concept noting that validity describes the ability of a research instrument to accurately measure what it is designed to measure. She moreover differentiates between content validity and criterion validity, where the former asks the question: “*Does the instrument relate to the construct being measured?*” and the later asks the question: “*Does the instrument measure what it is supposed to measure when compared to real-life observations?*” This study ensured internal validity by replicating the interview structure with each interview, and standardising questionnaires and rating & agreement scales.

The adaptive nature of the research drew differing supplementary questions. However, the author ensured that internal validity was not compromised. Multiple contacts within the firm contributed to internal validity. Triangulation between interview transcripts, questionnaires and rating & agreement scales further supported the internal validity of the study as prescribed by Golafshani (2003).

3.12.4 External Validity

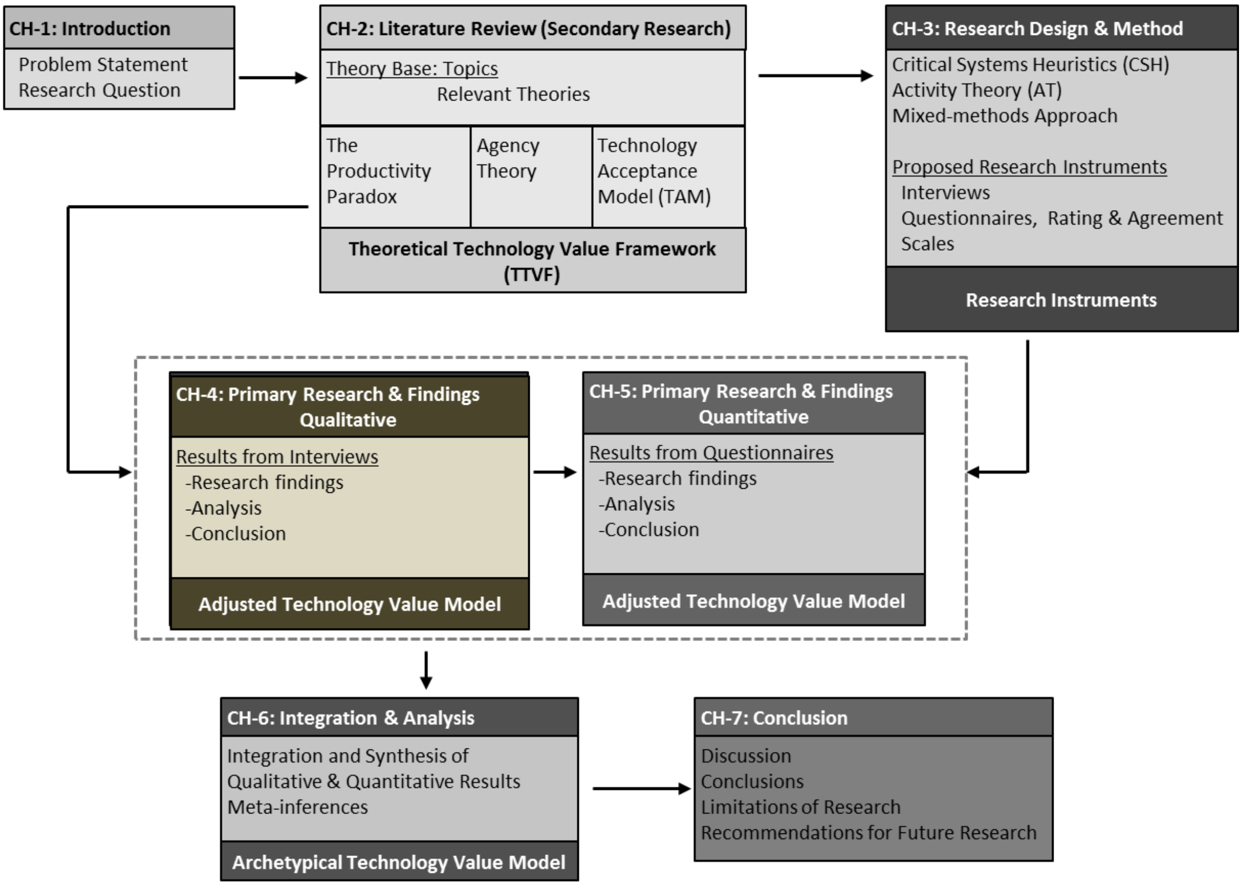
This research is limited by the generalizability of sample results to the population of interest within the context of external validity (King & He, 2005) through instruments relating to both qualitative and quantitative research approaches, and which is not strictly intended to be generalizable beyond financial institutions. The results from this study may proof to be relevant to other South African Information Technology intensive institutions; however, the verification of this premise is discussed in the section on future research. Even with a large number of responses and high response rates, strong hypothetical differences in the nonresponse group can produce misleading conclusions that do not generalize the entire target group and, consequently, limit a study's external validity (Urbach & Ahlemann, 2010). Therefore, it is necessary to address the issue of nonresponse before, during, and after data collection (King & He, 2005; Van der Stede, Young, & Chen, 2005).

3.13 Summary of Chapter 3

This chapter examined the theoretical causeways that were charted during the exploration and ultimate selection of appropriate and complementary research methodologies and corresponding research instruments. While Critical Systems Heuristics finds it locus within the distinguished history of systems thinking, Activity Theory in turn, developed from Russian cultural psychology. Both frameworks, however, have been shown to be pointedly useful in the investigation of the interaction concerning humans and IS.

The chosen frameworks are presented within a classical mixed methods research approach, where both qualitative and quantitative methods, and corresponding research instruments, are applied to the empirical investigation of the research questions. The following two chapters will examine the data gleaned from the application of the research instruments and subsequently demonstrate how the data supports and animates the value framework.

CHAPTER 4



CH-1: Introduction
Problem Statement
Research Question
CH-2: Literature Review (Secondary Research)
Theory Base: Topics
Relevant Theories
The Productivity Paradox
Agency Theory
Technology Acceptance Model (TAM)
Theoretical Technology Value Framework (TTVF)
CH-3: Research Design & Method
Critical Systems Heuristics (CSH)
Activity Theory (AT)
Mixed-methods Approach
Proposed Research Instruments
Interviews
Questionnaires, Rating & Agreement Scales
Research Instruments
CH-4: Primary Research & Findings Qualitative
Results from Interviews
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-5: Primary Research & Findings Quantitative
Results from Questionnaires
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-6: Integration & Analysis
Integration and Synthesis of Qualitative & Quantitative Results
Meta-inferences
Archetypical Technology Value Model
CH-7: Conclusion
Discussion
Conclusions
Limitations of Research
Recommendations for Future Research

4. PRESENTATION AND ANALYSIS OF RESULTS FROM INTERVIEWS

4.1 RESEARCH FINDINGS (QUALITATIVE)

4.1.1 Analysis of Metadata

Interviews were conducted with 31 individuals operating within the disciplines of information technology, business operations and organisational development, as depicted in Table 4.1 below.

TABLE 4.1 SUMMARY OF PARTICIPANT DESIGNATIONS (AUTHOR)

Participant Role	No
Delivery Manager	2
Divisional Executive	3
Divisional Technology Officer	3
Executive Head IT	9
Forensics Specialist	1
General Manager	1
HR Specialist	1
IT Risk Specialist	4
IT Security Specialist	1
Process Specialist	2
Programme Executive IT	2
Senior Manager Forensics	1
Senior Technical Consultant	1
Total number of interviews	**31**

From Table 4.2 it is evident that the 31 participants on average used phrases relating to the four value eroding behaviours of Unintentional Misuse, Active Abuse, Passive Disuse and Intentional Sabotage, respectively 7.1, 6.5, 6.4, and 6.3 times. Next, the three Behavioural Constructs related to respectively Attitudes, Beliefs and Intentions were on average referred to in interviews 4.5, 4.2 and 4.2 time by participants. Moreover, the four factors comprising the mitigation of value erosion were on average referenced by participants, during their oral replies, respectively 5.3, 2.4, 2.4 and 2.4 times. Lastly, the concept of "Value Dissipation" where participants raised the dualistic potential of IS to not only create but also dissipate value, scored highly at an average of 5.4 mentions per participant. Also scoring highly at 4.8, participants discussed the behavioural relationships between respectively:

1. The three Behavioural Constructs on the four value eroding behaviours
2. Each value eroding construct with regard to the other three value eroding constructs
3. The four value eroding mitigation factors and both the Behavioural Constructs as well as the four value eroding constructs.

Discussions concerning "Value Eroding Potential", scoring high at 4.0, related to interview question number four where participants were requested to rank the four value eroding behaviours from the behaviour that they considered to hold the most potential to dissipate value to the one that held the least. In their motivations for value eroding potential, participants consistently referred to risk rating metrics related to likelihood and impact. The value eroding potential for each of the four value eroding behaviours were purported to be the product of the likelihood that individuals would engage in a particular behaviour and the commensurate impact should the individual successfully execute the value eroding behaviour.

TABLE 4.2 MOST MENTIONED ASPECTS BY PARTICIPANTS (AUTHOR)

KEY TERM	Unintentional Misuse	Active Abuse	Passive Disuse	Intentional Sabotage	Value Dissipation	Degree of Control	Behavioural Relationships	Behavioural Attitudes	Behavioural Beliefs	Behavioural Intention	Value Eroding Potential	Training/ Communicating	Degree of Influence	Monitoring/ Measuring	Value Leadership
Int-01	21	13	20	14	11	7	3	5	7	4	5	10	3	0	6
Int-02	7	5	6	10	16	7	0	7	4	5	7	1	6	0	11
Int-03	8	8	3	8	10	9	3	1	4	3	6	3	5	3	4
Int-04	4	5	4	4	3	5	6	3	2	4	1	3	1	4	0
Int-05	7	8	3	7	6	6	3	4	3	6	3	4	1	2	2
Int-06	8	5	6	5	5	0	0	4	7	5	6	1	0	1	2
Int-07	3	12	4	7	3	5	3	10	4	3	5	4	1	7	2
Int-08	8	5	7	7	10	6	4	3	2	3	4	1	2	0	0
Int-09	6	6	5	8	4	2	3	2	2	2	6	4	3	1	3
Int-10	9	4	8	3	8	7	8	5	6	5	1	4	7	0	7
Int-11	5	8	6	6	5	2	7	0	0	3	4	0	1	2	1
Int-12	5	2	4	3	1	7	3	4	4	4	4	2	1	3	0
Int-13	10	7	8	7	7	4	8	5	8	6	4	2	2	3	0
Int-14	5	6	6	5	3	3	4	5	5	6	5	5	2	0	0
Int-15	5	6	4	8	8	10	2	2	2	3	3	5	2	4	1
Int-16	6	4	2	3	7	1	4	5	5	5	4	3	0	1	1
Int-17	10	7	8	10	3	3	6	7	1	4	10	2	3	0	5
Int-18	14	9	10	7	5	9	10	11	8	6	4	6	3	10	3
Int-19	3	4	4	5	5	2	7	3	2	1	3	2	0	3	0
Int-20	6	5	5	5	3	5	7	5	2	4	1	0	1	4	1
Int-21	10	8	12	6	6	4	2	3	2	4	3	5	1	2	1
Int-22	5	4	5	5	2	6	5	1	2	4	1	4	2	1	1
Int-23	8	7	9	5	3	5	9	8	4	8	4	5	0	5	0
Int-24	4	6	6	6	3	6	8	1	3	1	4	0	6	4	3
Int-25	5	5	5	4	4	6	5	15	17	9	2	4	3	2	5
Int-26	6	7	4	5	7	6	7	3	2	3	2	2	2	3	0
Int-27	3	4	4	4	4	3	2	1	1	3	1	0	3	2	2
Int-28	9	5	8	6	8	1	9	3	6	4	6	6	2	1	6
Int-29	8	4	10	4	5	13	7	4	5	4	8	1	5	6	3
Int-30	6	7	5	8	2	5	2	5	5	4	2	5	3	1	2
Int-31	6	14	6	9	1	9	3	6	5	4	5	5	4	0	3
TOTALS	**220**	**200**	**197**	**194**	**168**	**164**	**150**	**141**	**130**	**130**	**124**	**99**	**75**	**75**	**75**
AVE	7.1	6.5	6.4	6.3	5.4	5.3	4.8	4.5	4.2	4.2	4.0	3.2	2.4	2.4	2.4

4.1.2 Value Eroding Potentiality of IT

Generally participants concurred with the statement that the introduction of IS may not only create value for, but likewise inadvertently dissipate value from organisations. A senior forensics manager stated that:

"by giving people this tool you inadvertently and maybe unintentionally also open the doors for them to abuse the system in a way that they can see they can do". (Participant 04)

Another individual stressed the substantial changes and concomitant degree of employee uncertainty that the introduction of a new IS brings about within an organisation. End-users will form an opinion of the usefulness and usability of the new system and if this opinion proves to be negative, they are destined to:

"end up using it for unintended purpose". (Participant 20)

Yet another participant noted that the end-user may simply misuse a system due to a lack of proper training and that:

"it will not be because I had that intention". (Participant 20)

Participants also consistently referred to value erosion as a by-product of value creation especially within the areas of unintentional misuse and passive disuse.

An IT executive emphatically described the intervention that he had to effect to ensure that the business component of the organisation did not stalemate within quiescent behaviour. Since the business users perceived a new system to be valueless and even business disruptive, it was necessary for the divisional executive to launch a comprehensive change management programme. He summarised the problem that needed to be addressed as follows:

"we did not focus on the hearts and minds of the people. And why that was also partly the problem was because we just didn't have business people around supporting us and the project and then we realised that we're going nowhere". (Participant 06)

Moving into the recalcitrant area of activity, some users are seen to be opportunistically scouting the organisation's IS for weakness which they can exploit for personal gain. A senior manager noted that:

"people abuse the fact that the controls in an IS are lacking or maybe not as good as it should be and that's again coming back to the dissipation of value". (Participant 04)

Nine participants saw IS as tools that may, in extreme cases, be utilised by disgruntled staff members to intentionally harm the organisation, as one executive explained it:

"and some people, if they're very, very angry, and demotivated they'll suddenly start from here - from the bottom (intentional sabotage)**, and they would stick there". (Participant 06)**

In extreme cases, end-users who are resentful towards their employer may go as far as to employ IS to defraud the organisation or clients of the organisation. Once one of the three fraud-drivers namely Justification, Opportunity and Incentive, which facilitate the execution of fraud, presents itself, the user will purposefully commit fraud. A fraud specialist noted that users will rationalise their actions by reasoning that:

"I am entitled to this. I worked bloody hard and look at what bonus I get this year; look at my increase. So I rationalise it for myself and I do it". (Participant 04)

4.1.3 Activity System Prejudiced by Behavioural Constructs

As explained elsewhere, the graphical representation of the activity system in Figure 4.1 illustrates a subject (end-user), driven by a motivation to achieve an object (create or destroy organisational value). Feedback received from participants consistently established the prominence of behavioural beliefs, behavioural attitudes and behavioural intentions, as influencers informing the actions of end-users interacting with IS.

Moreover, participants, in agreement with the literature, described users as undertaking activities (execute particular computer instructions which may be work related or of a personal nature) that may be classed as either quiescent behaviour (unintentional misuse, or passive disuse) or recalcitrant behaviour (active abuse or intentional sabotage). While the object pursued by a user may be to create value by means of quiescent behaviour, the objective of users engaged in recalcitrant behaviour is pointedly different in that their motives are purely selfish and destructive to the goals of the organisation. The tension in the framework will constrain the **Object** until it is resolved via **Rules**, **Community** or **Roles**.

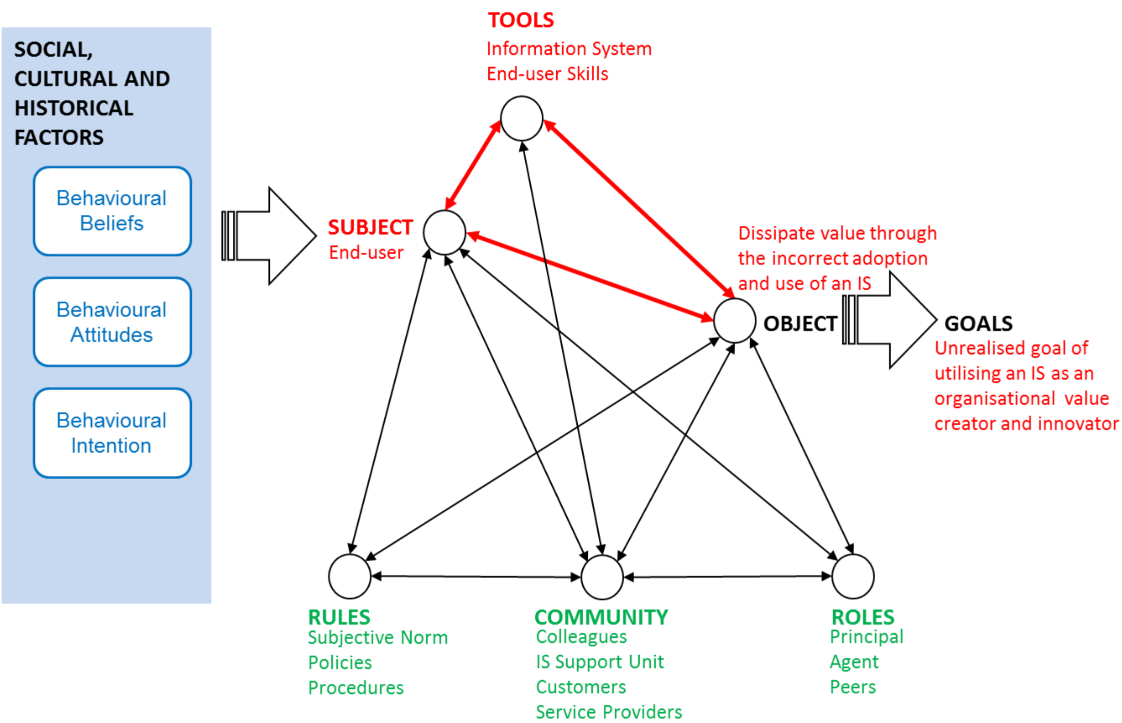


FIGURE 4.1 ADJUSTED ACTIVITY THEORY FRAMEWORK: SUBJECT-TOOL CONTRADICTION CAUSING ACTIVITY INSTABILITY (ADAPTED BY AUTHOR)

The aforementioned process is mediated by tools (inclusive IS) and signs (computer instructions, i.e. skills, and knowledge, i.e. understanding). Similarly to the forgoing paragraph, the object pursued by a user may be to create value by means of quiescent behaviour, but due to the user's lack of skill, technical knowledge or the overall complexity of the system, he may inadvertently destroy value through the improper use of the system or dereliction of use. Conversely, the skills and knowledge of users engaged in recalcitrant behaviour are pointedly different in that they are able to expertly utilise information tools to pursue their self-serving and destructive ends, inhibiting the goals of the organisation.

Furthermore, the above activities are actioned within the context of a **community** (co-workers, i.e. peers, subordinates, line managers, and end-supporters, i.e. the IT support department). It is within this community that users are perceived to be influenced by their colleagues and senior leadership towards the creation of organisational value.

Lastly, the activity framework makes provision for the introduction of controls (system and management) that find expression against the backdrop of **rules** and behavioural norms and a division of labour. It is through the establishment of these controls that users are guided towards correct behaviour, e.g. data validation, and prohibited from engaging in value destroying behaviour, e.g. systems that are protected from users with ill intend, via well designed access control configurations.

4.1.4 Behavioural Constructs

"Beliefs" Disambiguation

In an effort to disambiguate and accommodate the misconstruction participants displayed in their understanding of the concept of "*beliefs*" within the context of end-user interactions with IS, the interviewer allowed for two classes of beliefs namely: (1) Qualities innate to an individual that informs his moral or ethical opinions or convictions, independent of the activity of interacting with an IS. (2) An individual's beliefs towards an IS's usefulness and ease of use that ultimately determines system adoption and usage. Some of the opinions offered by the participants are subsequently summarised.

Fifteen participants felt that individuals' beliefs were intrinsic attributes that existed independent of the world around them, including IS. One candidate explained this view as follows:

"I don't see beliefs as having anything to do with IS... For me the belief is between what is right and wrong. Also, my belief between right and wrong influences the fact of whether I will ever get involved with criminal activity or intentional sabotage… Behaviour obviously is influenced by the person's belief, his moral reference". (Participant 04)

One individual simply defined behaviour belief as follows:

"a cultural thing, it's the moral of your users". (Participant 21)

Conversely to the foregoing position on the meaning of beliefs, three participants described an end-user's beliefs in relation to the individual's views regarding the usability and usefulness of IS, to quote one respondent:

"I mean, I believe a good IS should be having xyz and if it doesn't have it, my attitude towards using it or even believing in it, is not going to be there... I could wholly believe that, okay I can use it for one or two things, but the rest I'll use my other system, I'll use my old legacy system, I'll use my own spread sheet on that computer, because I don't trust it so much". (Participant 20)

An executive synthesised the discourse around the essence of the "*beliefs*" construct by suggesting that:

"If I don't believe in the system, or I have a negative attitude towards the organisation, either one of those two is going to constitute a misuse of the IS system that has been built". (Participant 31)

Not surprisingly for a reputable financial institution, another executive stressed the ethical culture of the organisation emphasising that:

“if your personal beliefs do not correspond with that of an organisation, or your personal values do not correspondent with that of an organisation, you will never be happy in that organisation… People with unsavoury beliefs would probably not fit into this organisation and will disappear”. (Participant 01)

The disparate views and understanding regarding the definition of beliefs necessarily impacted on participants’ views concerning the relationship between behavioural beliefs and other constructs within the Theoretical Technology Value Framework.

Behavioural Beliefs

Participant participants provided varying views in their descriptions and supposed role of the “behavioural beliefs” component within the Technology Value Model. One theme that gained increased support as the interviewing process progressed was that of the perceived threat that IS posed to users’ career prospects. Talking on behalf of his colleagues in general, an participant stated that:

“if their believe is that this solution which was implemented, is going to have a negative effect on their own careers or their own incomes or how they are viewed by the organisation, then they may passively disuse or abuse the solution”. (Participant 14)

The forgoing statement echoes the sentiment of participants who were adamant that users, through the process of anthropomorphism perceive IS to be either an ally or enemy, and if the latter, the IS needed to be avoided (passively disused) or destroyed (intentionally sabotaged). Conversely, unintentional misuse was understood by participants to be a product of behavioural beliefs in the sense that these users believed that they were actually utilising the system as intended. One participant defined the relationship as follows:

“Behavioural beliefs mean you’re doing something, and in your mind what you’re doing is correct and it’s appropriate. So it goes hand in hand with unintentional misuse”. (Participant 09)

An executive singled behavioural beliefs and behavioural attitudes out as those elements that are intrinsic within individuals, and that:

> **"generate the biggest causes of your unintentional and passive disuse. Because these are factors of, who people are, and what I call, their structural interpretation of life". (Participant 31)**

At times these "structural interpretations of life", adopted by individual end-users, stand in stark contrast to the interpretation of the organisation, as one divisional executive pointed out:

> **"When an employee had privileged access and was checking people's account balances, for no purpose other than to know how much everybody else has. And I watched that active abuse of that access, and when we did the disciplinary on that employee we began to realise that his belief was that he had to understand things about people that he had no knowledge of, and then his attitude was that he was not violating their privacy by taking out their bank account balances. And his intention was pure; I didn't want to hurt anybody! He just wanted to know. And I was quite taken aback to see how, what we think of as active abuse, actually linked to his behavioural belief, his behavioural attitude and his intention, which were not aligned. So, I think that in terms of belief, attitude and intention, people's beliefs and attitudes have the greatest influence on their unintentional misuse". (Participant 22)**

Participants interpreted both behavioural beliefs and behavioural attitudes, which is discussed in the next section, as informing a person's unintentional misuse and passive disuse. While they suggested that these behavioural dimensions may even inform active abuse, they were quick to downplay this relationship stressing behavioural intention to be the predominant driver of recalcitrant behaviour i.e. active abuse and intentional sabotage.

In conclusion, a senior manager made the following observation regarding the beliefs of employees:

> **"I'm not so sure that an organisation can influence somebody's beliefs". (Participant 04)**

She did however go on to note that the organisation had put deterrents in place to prevent misconduct, as described in the following example:

> **"… how do you treat people who have been found guilty of dishonesty? We publicise their names. We don't worry about the fact that people may sue us and do all kinds of things, and threaten to sue us because we issue their names and we tell everybody in the organisation exactly what they've done". (Participant 04)**

Behavioural Attitudes

Behavioural attitudes were understood by participants to influence both the two quiescent as well as recalcitrant value eroding behaviour constructs. Moreover attitude in particular was highlighted by 17 participants as both residing within and outside of the purview of external behaviour correcting controls imposed on employees. However, agreement prevailed on attitude as being subjective to external influences. The following comments illustrate the foregoing:

> **"Attitude is more controlled within an individual, which systems cannot control. So, the attitude I do believe you can influence. So if the attitude is a negative one, you probably need to exercise a little bit more control and if not a negative one, but actually one of trying to create value, then it's more an influencing. Attitude, I think is going to reflect right across, whether it's unintentional initially…, or whether passively…, or whether… actively planning to… actually abuse the system and then, intentionally… to go to the ultimate and… in terms of being destructive, sabotage the system". (Participant 13)**

On the one side users described attitude as being informed by their beliefs of a systems' utility:

> **"You develop attitude to a system because it doesn't maybe do what you believe as an expert it's meant to do. I mean, I believe a good IS should be having xyz and if it doesn't have it, my attitude towards using it or even believing in it, is not going to be there". (Participant 20)**

Conversely, a programme executive made an interesting case for an employee's attitudinal predisposition describing it as being a function of the manager's attitude, stating that:

> **"It's about the employee's attitude as well as the manager's attitude". (Participant 03)**

Both behavioural beliefs and attitudes were perceived as having a direct influence on passive disuse and active abuse, as described in the following statements:

> **"Passive disuse is definitely influenced by behavioural beliefs but more strongly start speaking to your attitude. You now have an attitude about this thing, because you have an underlying belief, hence you more likely decide I'm going to stand from this thing and watch it fail. Behavioural intention and behavioural attitudes are both closely correlated with active abuse. Passive disuse, I would say, is mostly most closely correlated with behavioural attitudes. Depending on your specific attitude towards the solutions, unintentional misuse may still play a roll, but passive disuse could, if you were not in agreement with the implementation of the solution, could then start playing much more of a roll". (Participant 14)**

While the existence of a relationship between attitude and passive disuse was generally established amongst participants, one participant noted that while an actor's attitude, driving him towards passive disuse, may be perceived to be negative his intention may be positive. So for example if a user does not believe that the existing system has the utility to assist him in completing his tasks correctly and within the allocated timeframe, he may decide to not make use of the system and substitute the preferred system with a legacy system that will enable the user in particular, and the organisation in general to succeed. One executive captured this foregoing sentiment as follows:

> **"Passive disuse of IS - that's ignoring the system even though it's there. So for instance, I go and procure something outside of the procurement system. Attitude, for me it's the biggest one there, and I don't see that as only negative, so for instance it's in the interest of the brand that I will get this thing done in two weeks. The new system is not able to do that, but I can do it in the time outside of the two weeks. That's not a negative attitude. That's a can-do attitude. In other words, there is an underlying problem there which is system usability". (Participant 03)**

Participants acknowledged the key importance of the human component weaved into business capabilities. One human resources specialist noted that:

> **"Systems and processes are as good as the people, if you get people's attitudes, behaviour right you'll minimise misuse and abuse of the system". (Participant 13)**

He went on to underscore the necessity for a positive employee attitude as a requirement in the adoption and usage of an IS set to generate value for an organisation:

> **"You can have the best system, but if your people are not tuned in, the attitude is not correct, and they're not aligned with it, no system will work, because human behaviour can actually destroy any system in any process. If you could get people's attitudes right in terms of a system, I think you will see a different set of behaviours, a more constructive set of behaviours in the end of the day". (Participant 13)**

Behavioural Intention

Participants understood behavioural intention to be the salient contributor or influencer of end-users' value eroding behaviours, as noted by an executive:

> **"I think intention plays a bigger role in all four – behavioural** (Activity)**... constructs" (Participant 16)**

An exception was noted by one participant regarding the relevance of behavioural intention to unintentional misuse, since the latter implied a lack of knowledge of the system's usage. Behavioural intention was seen as comprising an element of system knowledge resulting in able purposeful usage.

> **"I think it is very much about intention that would result in, call it the damage caused. If you have intent to abuse then, you know, that will cause the biggest damage intent; if you have intent to sabotage, that will have the biggest damage". (Participant 07)**

An executive cautioned that the exclusion of end-users, from the end-to-end systems development life cycle process, will prevent positive positions of intention to be established within these users, resulting in business value erosion.

> **"Now, there's a behavioural intent that can erode value. So, in the creation of the system, if you have… behavioural intention playing a role in terms of the attitude of people helping construct the system, it's also going to be intentionally to add value. So, the whole value chain is impacted by this model; not just the end-user". (Participant 31)**

The same executive pointed out that a discontinuity, may in certain cases, come about within the flow from behavioural beliefs to behavioural attitudes and behavioural intention. This breakage in the flow forms between behavioural intention and the preceding two constructs. A user may be so overwhelmed by an unfamiliar system that she would immediately move towards a position of passive disuse. Simply because of her belief that the system is too complex for her to master, her attitude towards the system may be negatively influenced. There is no malignant intention of omission or doing anything to erode value. On the contrary, the user is of the view that her not doing anything has less of a value eroding impact on the organisation than her erroneous interactions with the IS would.

> **"Now, in Namibia the one lady does this specific job. The format and layout on what she's got, slightly, marginally changed. This lady stressed. She would have just stressed out and who knows... maybe so bad as to leave the organisation or walk away or something. And that's all those behavioural believes and behavioural attitude. They're not intentional". (Participant 31)**

Interrelationship between the three Behavioural Constructs

In the main, participants agreed with the layout and order between the three behavioural constructs of the Theoretical Technology Value Framework, as illustrated by the following commentary:

> **"So believes, attitudes and intention, there's almost like a hierarchy there, or a flow, you know, your beliefs influence your attitude… Essentially they are stacked to go from beliefs to attitudes to intention. So in my mind it would definitely be almost ranking like that… You believe something and hence you have a certain attitude about something. That influences your intention, right? And then ultimately it's going to influence your action". (Participant 02)**

Statements provided regarding the perceived interrelationships amongst the three constructs confirmed that participants saw each construct to be interconnected to the other two constructs:

> **"So a belief creates a foundation of an attitude, which would be positive or negative... You now have an attitude about this thing, because you have an underlying belief…**

And the belief and intention are very close to each other… And then intention is the last one. Intention is very close to attitude for me". (Participant 02)

While the relationship between the three behavioural constructs were confirmed by the majority of participants, one participant noted that there may be a disconnection (as described elsewhere in this thesis) between behavioural intention and the preceding behavioural constructs. The participant described this reactive behaviour as follows:

"I think sometimes your intent can be slightly different to... not necessarily influenced by your base beliefs. It could be something that triggers you to do something specific". (Participant 07)

In a supporting comment an executive shared the following view attributed to some users:

"So, this thing is hard for me to do therefore I'm not going to do it versus the other guy who is saying: "Up the organisation, up the world... I don't care... I'm... whatever". That affects more for me active abuse and intentional sabotage. OK, so it's intentionality. That's all we're talking to. Whereas behavioural beliefs and behavioural attitudes do not necessarily talk to intentional outcomes". (Participant 31)

Commenting on users' inclination to move up or down between the four activity/action constructs, one executive head pointed out the impelling role of behavioural beliefs and behavioural attitudes, commenting that:

"There'll be more my belief and attitude that could then switch between the two. If I am unintentionally misusing something and I am aware of it, but my belief system is strong… I'm just not going to cross that barrier (to recalcitrant behaviour). So, if I'm intentionally not trying to abuse the system. The point that I'm trying to make, is, that belief and attitude would have to influence me to go across". (Participant 19)

4.1.5 Activity System Impeded by Unintentional Misuse

Figure 4.2 is provided as a visual guide delineating the relationship within the Activity System between the Subject (employee/ end-user), the Tools (IS/ end-user skills) and the Object that results in the dissipation of value through the incorrect adoption and use of IS.

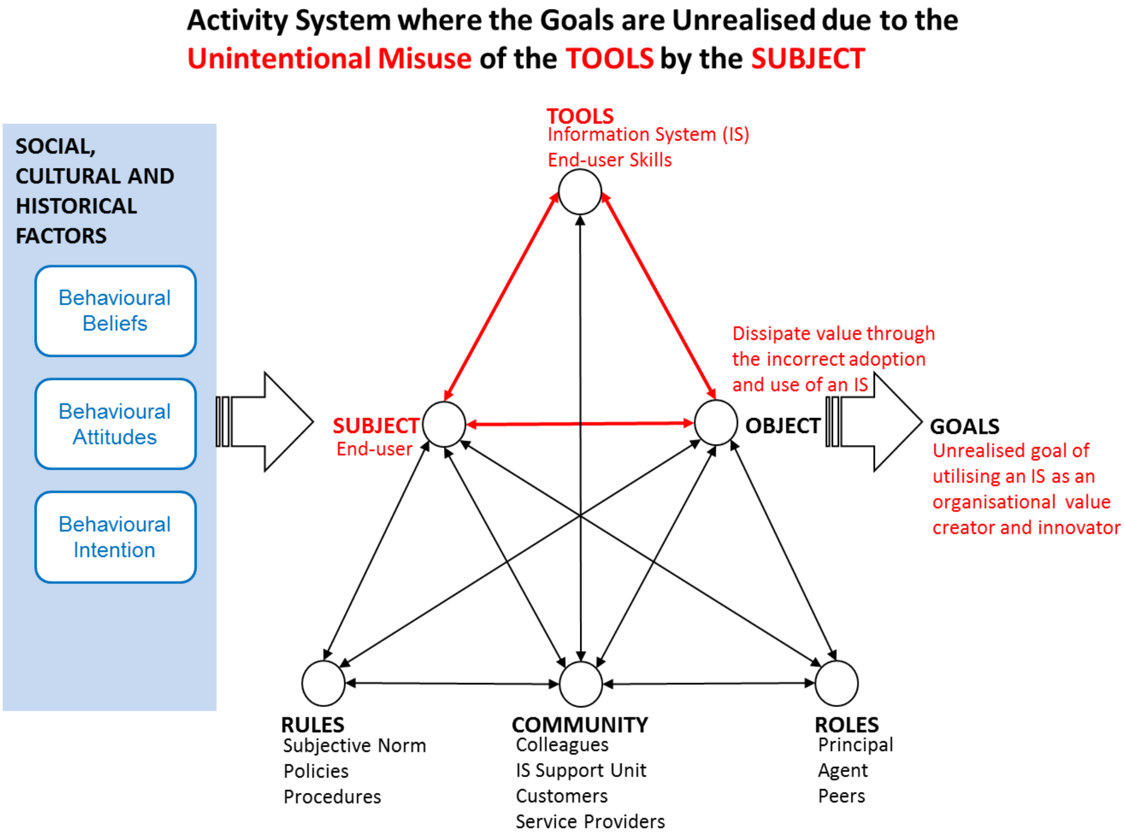


FIGURE 4.2 ACTIVITY SYSTEM IMPEDED BY UNINTENTIONAL MISUSE (ADAPTED BY AUTHOR)

As noted elsewhere, unintentional misuse was identified as being closely related to a user's behavioural beliefs. Users are described as being subconsciously of the belief that the work which they are doing is correct and value adding to the organisation. They are not aware that they are engaging in activities/ actions related to unintentional misuse:

> **"Going back to what I explained earlier, if you don't know what you're doing, is wrong, it means in your mind what you're doing is correct and it's appropriate. So it goes hand in hand with unintentional misuse". (Participant 09)**

Moreover, unintentional misuse was extended to cases where individuals do not make optimal use of a system. One participant provided an example where front line staff were required to capture new clients' details on a system. Rather than completing all the available fields and ensuring the organisation had a comprehensive view of the client (this is required to enhance the process of up-selling and cross-selling products to clients), the staff member resolved to complete only the mandatory fields. It was further suggested that management could correct this behaviour by positively altering the employee's behavioural beliefs and behavioural attitudes.

Participants furthermore did not perceive unintentional misuse to fall within the same category as the other behaviours, since its cause, unlike the other three behaviours, was not seen to be grounded in vicious intention. One divisional technology officer explained his view on the subject as follows:

> **"I would actually see unintentional misuse as not necessarily having such a big relation to the others, because I think that is purely... either by lack of knowledge, lack of training that they're not potentially using the system as intended. So I would say that sort of stand separately... So it's not as though they are deliberately trying to misuse the system, they're just doing it in a way that's familiar to them… It's because your behavioural beliefs are such that you don't think you're doing anything wrong… It may be your moral attitude towards things but you don't think you're doing anything wrong, so I think this behaviour is unintentional". (Participant 23)**

In response to the question where participants had to rank the four value eroding behaviours from the behaviour that had the most potential to dissipate value to the one that had the least potential, the majority of participants stated that unintentional misuse had the highest potential. They were also unified in their motivation for this choice, noting that while the consequences of an unintentional misuse case may not be as severe as for example that of intentional sabotage, the occurrence of unintentional misuse flowed almost pervasively throughout organisations.

"And therefore I'm assuming that the biggest issue will be with unintentional misuse". (Participant 14)

4.1.6 Activity System Impeded by Passive Disuse

Figure 4.3 is provided as a visual guide delineating the relationship within the Activity System between the Subject (employee/ end-user), the Tools (IS/ end-user skills) and the Object that results in the dissipation of value through the non-adoption and disuse of IS.

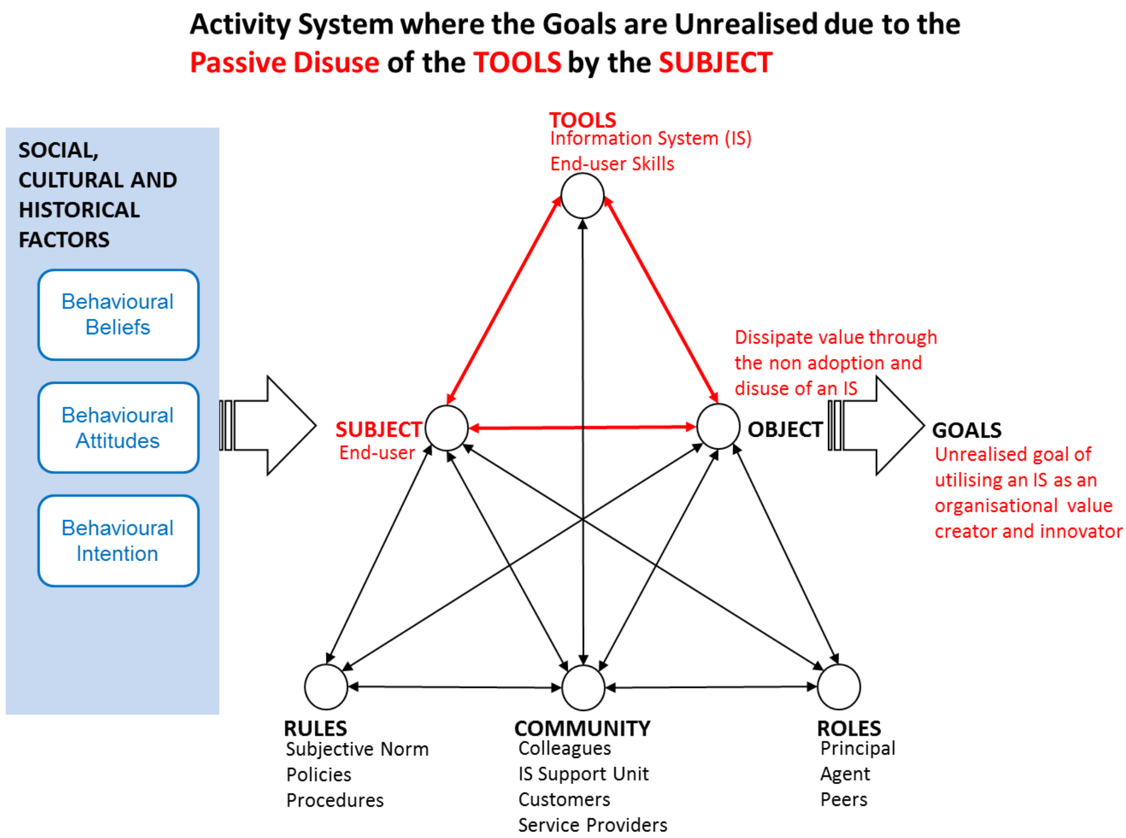


FIGURE 4.3 ACTIVITY SYSTEM IMPEDED BY PASSIVE DISUSE (ADAPTED BY AUTHOR)

The strength of an individual's effectiveness beliefs will determine if he will exert himself to handle a particular situation. If he believes that his coping skills surpass those required, he may more readily choose to engage in the situation. Conversely, if he believes that his coping falls short of that required to deal with threatening situations, he may choose to avoid it (Torkzadeh, Koufteros, & Pflughoeft, 2003). On the one side users are motivated to consciously engage in the activity of passive disuse simply because it is perceived to be the next best alternative to unintentional misuse.

> **"And that destroys value because, immediately what you have is, you have double work and you also have something that you've paid for that's not being used, so you're effectively wasting a licence. So, that is definitely also dissipating value". (Participant 05)**

At a more sinister level, one participant theorized that a disgruntled employee may not simply stop by engaging in passive disuse but will gravitate down the stack, towards both active abuse and, if he has the opportunity, intentional sabotage. This was however not perceived to be due the to the existence of reinforcing factors that existed between the three activities, but rather as a result of the individual's misaligned belief system at a given point in time.

Notwithstanding this, there prevailed a shared consensus among the participants that passive disuse introduced numerous instances of complexity and undesirable noise into the overall IS landscape. The forgoing is seen as being attributable to the dual impact of passive disuse in that essential data are not inputted into the necessary data fields for processing feeding into management IS, also, additional "versions of the truth" and duplicate processes are being created with the capturing of informational or transactional data in decentralised IS.

In addition to the foregoing, a participant described the pervasiveness of this activity as originating from a progressive end-user attitude of wanting to solve problematic situations. Participants further clarified their positions by noting that the motivations underlying passive disuse may not necessarily only be ignoble but honourable as well. One executive head described this as follows:

> **"if it's in the person's mind the right thing to do because he's faster or anything like that, or more effective, then it's actually a matter of changing his or her mind for the greater good of the organisation: "… don't use your Excel because you might think**

you're faster, but actually the bigger picture is the following: You've now created four more versions of the truth, whereas if you work of the core system..."". (Participant 02)

Time pressure was also identified as a contributing factor to the defaulting of end-users' preferences towards the use of legacy systems. A typical example that was styled by one participant was that of a branch environment where branch staff are required to make use of a new core banking system. However, when the staff members are under pressure, with long queues of clients forming that need to be serviced, they will tend to default back to the old system that is familiar and available, and subsequently settle back into a familiar position where they are able to service clients much faster.

Participants moreover understood the phenomenon of individual passive disuse to be a precursor to team passive disuse, stating that individuals have a tendency to share *work-arounds* with their colleagues. Once an individual has identified a work-around that is effective or efficient, albeit non-procedural, he will rationalise his improper behaviour over time to a degree where he has convinced himself that it is acceptable, at which point he will begin to promote the work-around amongst his peers. To this end, the initiator will not only attempt to convince his colleagues of the usefulness of his work-around but also justify its usage.

System controls and managerial oversight were identified as being the most effective counter measures to prevent, detect and correct passive disuse. Participants suggested that this should be done by firstly switching off competing legacy systems and where this is not possible, restrict access to it, and furthermore building audit trails and data input validation requirements into systems. While the former will ensure that users' usage of mandatory systems are monitored the latter will attempt to ensure correct data is inputted into the systems.

Moreover it was suggested that end-users needed to be provided with an end-to-end understanding of how data creates a strategic advantage at executive level. It was recommended that this be done by assisting staff to recognize how their input of transactional data is fed from the mandatory end-user systems to a number of management dashboards and reporting tools that are reliant on timely, correct and complete information to, in turn, provide useful information to executives. In addition, users need to be made aware of the fact that, while the system may take longer to process certain transactions simply because a number of steps in the legacy process had been automated, the overall execution time of the transaction is reduced substantially. One participant explained this by providing the analogy of being stuck in traffic.

> **"What the one system does, is automate a lot of stuff - so it does a whole bunch in the background that you're doing manually. So, it feels like the system is slow, but in fact, if you enter and time it, it is way faster. But because you are passive it feels like you're not doing much... it's like sitting in traffic. You'll say, well, I'll take the back route. So you feel you're actively driving, but you actually don't go faster". (Participant 31)**

Another preventative recommendation to counter the occurrence of passive disuse, suggested by 12 participants, was the roll-out of an effective change management strategy where users are persuaded of not only the business value that the new system will provide to the organisation, but more importantly, the job-related value that it will create for them as individuals. Since the strategy of the organisation is to firstly buy off-the-shelf applications and secondly build propriety applications, the marketability of employees who achieve mastery of a particular system, increase correspondingly.

4.1.7 Activity System Impeded by Active Abuse

Figure 4.4 is provided as a visual guide delineating the relationship within the Activity System between the Subject (employee/ end-user), the Tools (IS/ end-user skills) and the Object that results in the dissipation of value through the abuse of IS.

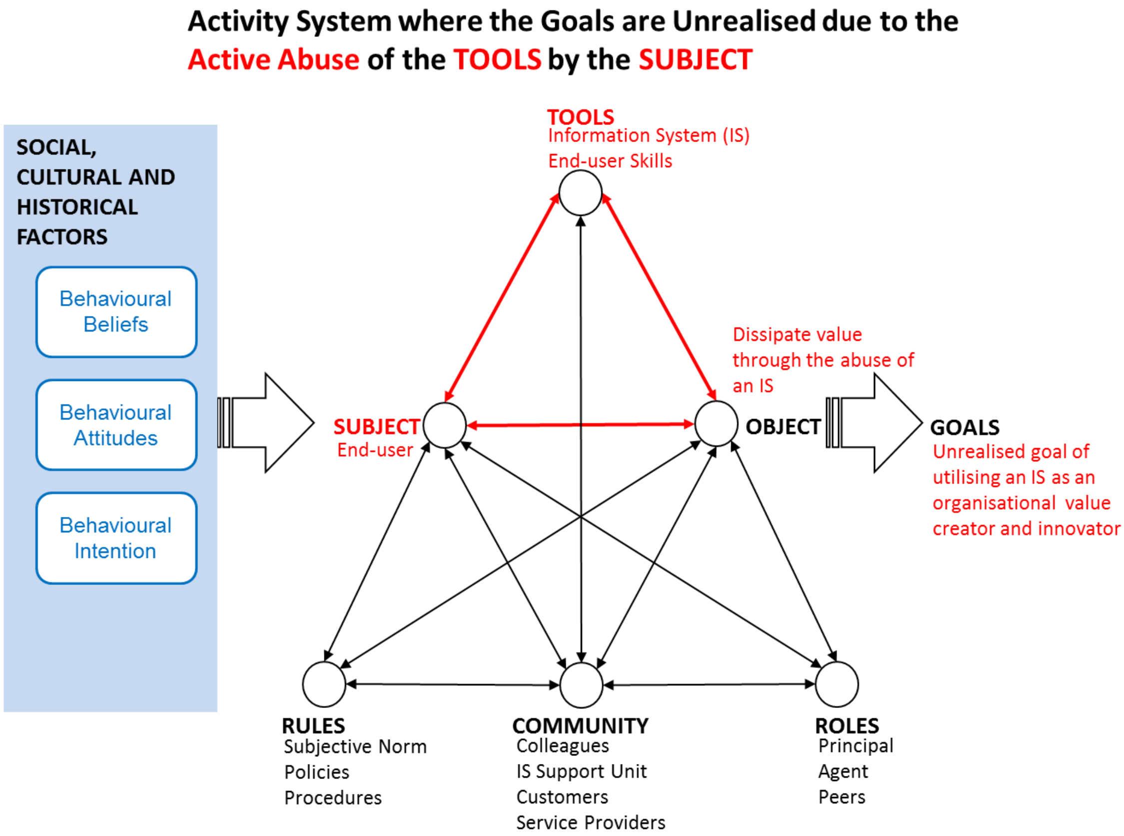


FIGURE 4.4 ACTIVITY SYSTEM IMPEDED BY ACTIVE ABUSE (ADAPTED BY AUTHOR)

As with the foregoing construct, there emerged no evident consensus within the feedback from participants regarding the salient cause of active abuse. Moreover, except for agreement on the pervasive nature of active abuse within the organisation, participants did not agree on the extent to which active abuse eroded business value in comparison to the other three constructs. Behavioural beliefs, attitudes and intention were all identified as possible sources of active abuse. In contrast to the previous two constructs, the motivators driving active abuse were isolated, together with those related to intentional sabotage, within the ambit of malicious behaviours. The vast majority of participants expressed disgruntled end-user's behavioural beliefs, attitudes and intentions as being malicious, ultimately resulting in the recalcitrant behaviours of active abuse and intentional sabotage. Active abuse and intentional sabotage were moreover perceived to be reinforcing constructs that:

> **"feed each other". (Participant 23)**

Work ethics and personal values were identified to be the biggest losers when participants considered the decay of individuals' behavioural beliefs.

At least two participants, while supporting the view of active abuse as comprising a value eroding element, cautioned that provision should be made for the notion of end-users who abuse or even sabotage systems with neutral or even good intent. Neutral intent is summarised in the following statement from one participant:

> **"I think that people who actively abuse IS have a belief that it's OK or it's not actually hurting anybody or there's plenty more of that where it came from... Internet type of abuse you know, people believe that there is plenty of bandwidth so they watch YouTube the whole day. You know, nobody is actually paying, you know, kind of for free because they don't see the cost, they don't see the impact…, the negative consequences". (Participant 05)**

Some users were also seen as having developed an attitude of give-and-take towards their employers where they will play-off the use of their personal time and resources for the benefit of the company, against them making use of company time and resources for their own benefit:

> **"So, I worked over the weekend therefore Monday I will surf the internet because I've met my deadline for Monday morning". (Participant 25)**

At the same token some users may perceive themselves to be self-appointed "end-user testers" of production systems, and they strive, through their actions of unsolicited active abuse, to create awareness amongst IT development & IT support units and the management cadre, of weaknesses and inefficiencies in particular IS.

The third class of users who engage in active abuse are those who are described by participants as having malicious intent towards the organisation. This intent to abuse corporate resources is understood to extend well beyond IS and include all corporate resources and assets. Participants further conferred on this class the designation of repeat offenders, noting that these individuals have lost their moral compass and subsequently their behavioural beliefs and attitudes have become debased. While these individuals were viewed by one participant as having the potential to develop into saboteurs of IS, the majority classed intentional sabotage as residing as an isolated activity. One divisional executive clarified his position on the locus of intentional sabotage as follows:

> **"Potentially, if my issues are not being resolved, I could come from passive to active abuse. I would never be able to, just because the issues are not being resolved, go to intentionally sabotage". (Participant 06)**

4.1.8 Activity System Impeded by Intentional Sabotage

Figure 4.5 is provided as a visual guide delineating the relationship within the Activity System between the Subject (employee/ end-user), the Tools (IS/ end-user skills) and the Object that results in the dissipation of value through the sabotage of IS.

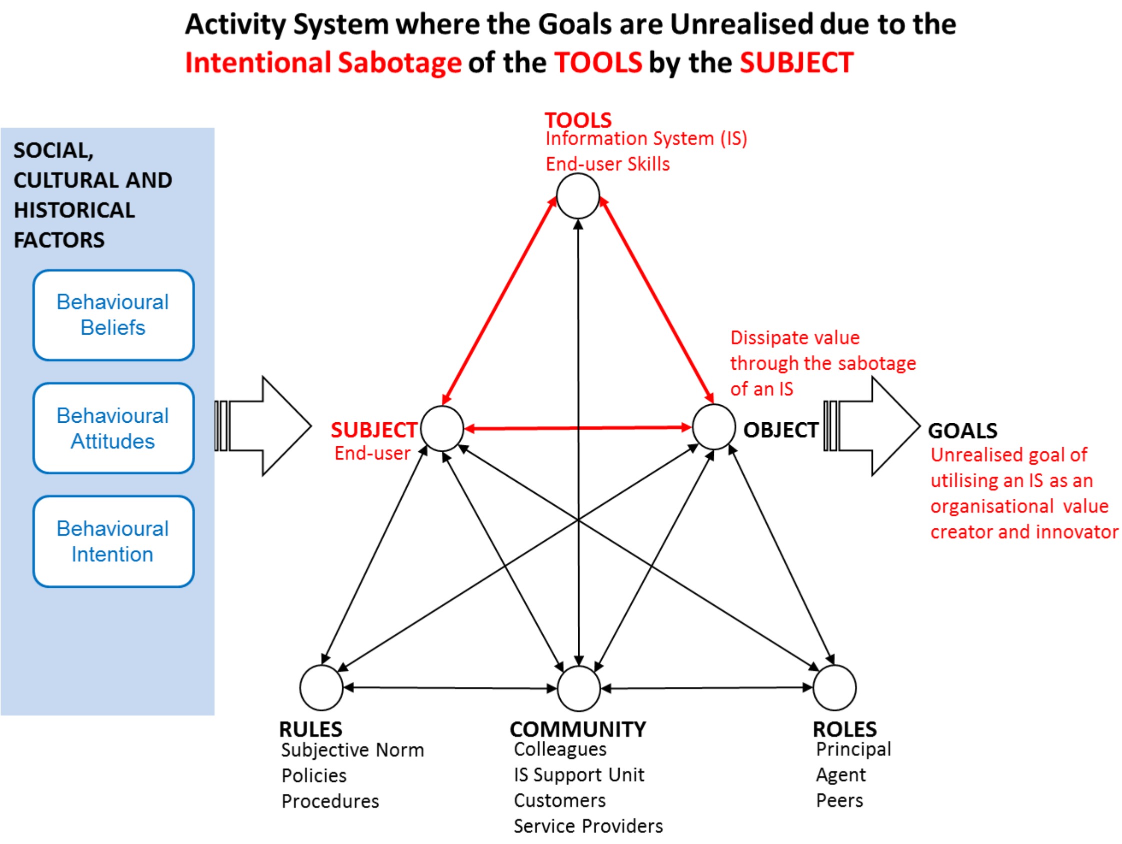


FIGURE 4.5 ACTIVITY SYSTEM IMPEDED BY INTENTIONAL SABOTAGE (ADAPTED BY AUTHOR)

Again, in a similar vein to active abuse, no evident pattern emerged from the feedback provided by participants regarding the main behavioural driver of intentional sabotage. While participants did point out the improbability of a successful in-house intentional sabotage event occurring, many were in agreement that the impact of a single yet particularly forceful attack could possibly cause the greatest harm to the organisation in terms of its value destroying capability.

While intentional sabotage activities from employees are believed to be rare, attackers were perceived to be very knowledgeable. Unlike unintentional misusers and passive dis-users, intentional saboteurs were perceived to be individuals who had extensive IS knowledge and skills. This said, participants in the main agreed that intentional saboteurs belonged to a distinctly different group from that of the individuals engaging in activities associated with quiescent behaviour.

One participant noted that a person's deviant belief system developed:

> **"when people's behavioural beliefs don't align with the values of the organisation", (Participant 27)**

would ultimately direct one's tendency to intentionally sabotage organisational IS. Others noted that hacktivists are driven by ideology i.e. a political or social causes and not essentially a belief system conditioned for personal gain. A third group believed that an employee may have the purist of beliefs yet still engage in intentional sabotage if he harboured a temporary bad attitude towards the employer that momentarily subjugated his beliefs. Moreover, an employee's beliefs may be subjected to his perception of the organisation's treatment of him. If the employee perceives the organisation to be sabotaging his career or dreams or treating him unfairly he may reciprocate by in turn sabotaging the organisation's vision and mission.

Participants further argued that the preceding course of action may at times originate from the employee's authentic belief that his livelihood will be compromised by the introduction of the new system. This perceived fear, genuine or false, was articulated as follows:

> **"Or it can come from very simple job protection. You know, somebody's been doing something in a particular way for thirty years, and when you come along with something new, you're going to make them obsolete. They sabotage. They intentionally sabotage what the new system does, in the deluded belief that's all that will make the new system go away if only they can show people that this thing doesn't actually work, and then eventually they'll take it away and then my job is safe". (Participant 05)**

Most users who engage in intentional sabotage activities were described as having ill intent, i.e. their behavioural intention was to cause damage on a large scale. In line with the preceding section however, two participants highlighted the possibility that some users may be sabotaging systems with good intent, i.e. to draw attention to problems embedded in the systems. Perceived problems may implicate system features relate to both usefulness and usability. They go on to suggest that some frustrated users may feel that only radical action from their side will gain the attention of executives at the right level of decision making to sufficiently address the serious defects in the organisation's IS.

4.1.9 Interrelationship between the four Activity/Action Constructs

While to most participants the relationships between respectively the two quiescent behaviours and the two recalcitrant behaviours were clear, not all agreed on the existence of potential relationships crossing over between quiescent and recalcitrant constructs. One executive head expressed this sentiment as follows:

> **"Unless my belief system changes, I can't see unintentional misuse becoming intentional sabotage. So I think, in the categories that they have been put together in terms of recalcitrant behaviour you know, unintentional misuse and passive disuse could influence each other, but I don't see a relationship between the quiescent and recalcitrant behaviour". (Participant 19)**

Four participants strongly suggested that there was no relationship, causal or otherwise, between what they termed the two unconscious (quiescent) behaviours and the two conscious (recalcitrant) behaviours. In contrast to the foregoing five of participants were at pains to note that given the right conditions e.g. end-users becoming hypercritical of a particular system, these end-users may find themselves moving down the stack of the four activity (behaviour) constructs.

One individual noted that employees who become aware of the fact that they had unintentionally been misusing a particular system, by default move into the space of active abuse or intentional sabotage if they continue their actions unchecked. If they experience no corrective action or consequences for their now conscious improper behaviour, they may intensify their actions even further, causing ever more organisational value to be eroded over time. Moreover, employees who become disgruntled while operating within the area of passive disuse may move down the stack towards active abuse and if an opportunity presents itself end up intentionally sabotaging the organisation's IS. Participants were quick to note that the forgoing does imply causality between behaviour (activity) constructs but that the movement is informed by the three behavioural constructs of beliefs, attitudes and intention. An executive argued that:

> **"With unintentional misuse you can start creating behaviours that become your actual process where it becomes passive disuse to active abuse... If my belief system changes over here** (quiescent behaviour) **then I think I could switch over** (to recalcitrant behaviour)**". (Participant 19)**

4.1.10 Activity System Corrected by Degree of Control

Figure 4.6 is provided as a visual guide delineating the relationship within the Activity System between the Rules (subjective norm, policies and procedures) that collectively prevent, detect and correct the activities of a Subject (employee/ end-user), towards the achievement of a desired Object that results in the prevention of value dissipation resulting from the adoption and usage of IS.

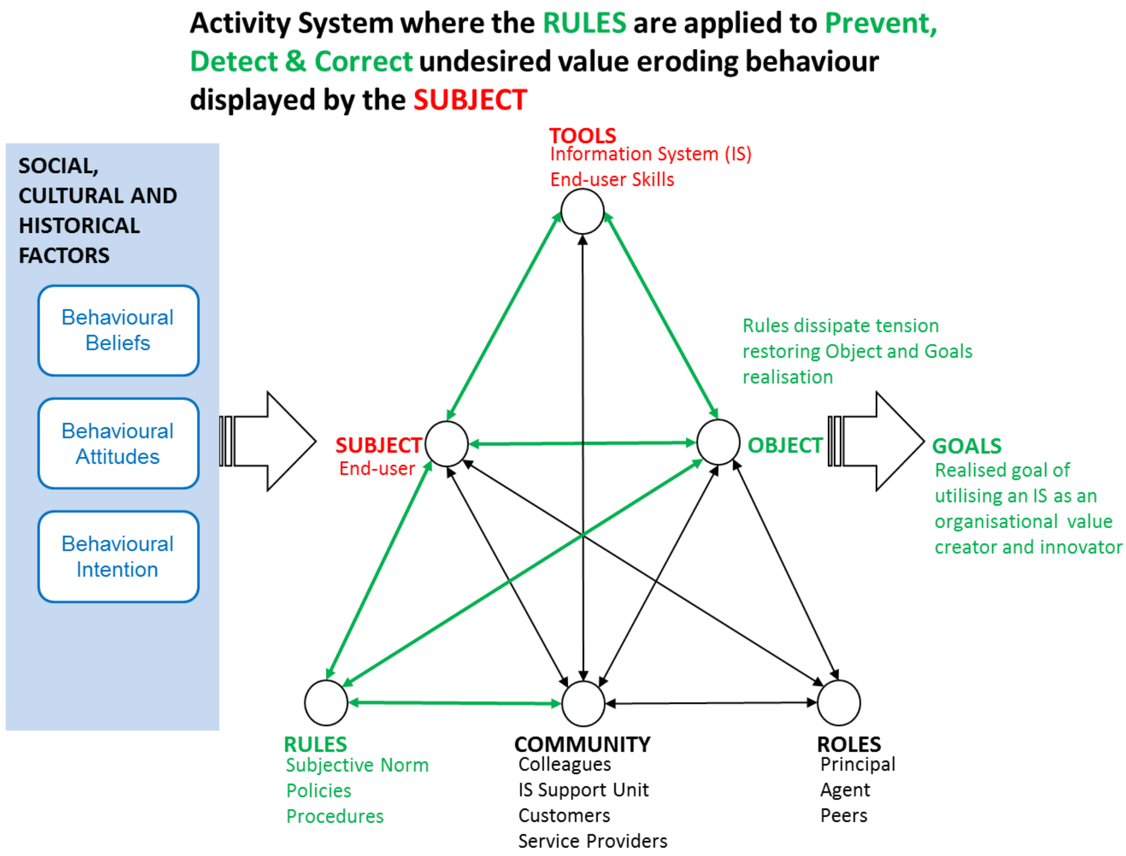


Figure 4.6 Activity System Influenced by Rules (Adapted by Author)

Participants described control measures as being useful in the prevention, detection and correction of undesirable behaviour, but of little value in addressing individuals' beliefs, attitudes and intentions. Preventative controls were perceived to be more desirous than detective or corrective controls, as the latter were seen to be reactive and subsequently less effective. It was noted that where individuals were aware of a detective control, they may refrain from a particular improper activity simply because of the fear of being caught out, and not necessarily as a result of their beliefs and attitudes having been reformed. This deterrent can however not be applied universally as some individuals will still engage in this activity as their tolerance for engaging in risky activities is higher than that of their peers. Conversely, if proper preventative controls are put in place, the same individuals will refrain from particular undesirous activities simply because they do not have appropriate access rights to execute a particular action.

Participants moreover stressed the importance of not only managerial oversight but also the example set by management. Management oversight is perceived to be undermined if the manager does not display a level of consistency within all areas of responsibility and behaviour. The example set by management is seen as a determining factor that, to some degree, prevents and/or mitigates undesirable employee behaviour.

One participant suggested that while quiescent behaviour (unintentional misuse and passive disuse) may be better mediated via the positive influence of colleagues and leadership, the implementation of proper system controls are required to ensure recalcitrant behaviour (active abuse and intentional sabotage) does not negatively impact on the organisation. In the same vein, participants suggested that the effectiveness of system and management controls in the prevention of unintentional misuse and passive disuse is enhanced if employees' beliefs, attitudes and intentions towards any new IS being implemented are positively influenced by management.

The limitations of system controls were highlighted by one participant who suggested that organisations too often veered away from their responsibilities of properly educating, encouraging and boosting the morale of employees, in preference to the technocratic fallacy that the system controls were the panacea to all end-user behavioural problems.

4.1.11 Activity System Corrected by Degree of Influence

Figure 4.7 is provided as a visual guide delineating the relationship within the Activity System between the Community (colleagues) and Roles (principal/ leadership) that collectively prevent, detect and correct the activities of a Subject (employee/ end-user), towards the achievement of a desired Object that results in the prevention of value dissipation resulting from the adoption and usage of IS.

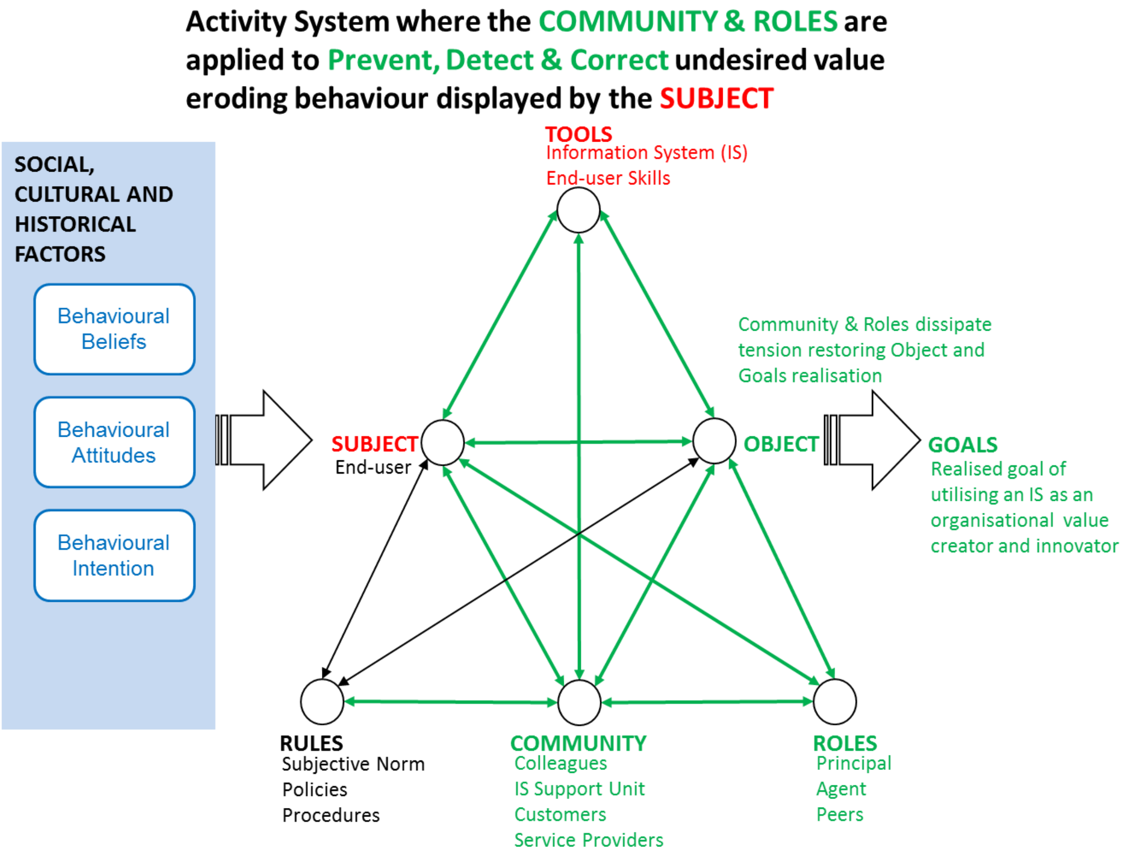


FIGURE 4.7 ACTIVITY SYSTEM INFLUENCED BY COMMUNITY & ROLES (ADAPTED BY AUTHOR)

The degree of influence was described as being paramount to an organisation:

> **"So my view is that leadership is a key driver to establish and maintain value driven IS. The technology is important but without the users to drive the systems, and effectively leaders to guide the users, the unfortunate outcome would be a failed IS". (Participant 10)**

Moreover a values driven influence was seen as the process whereby executive leadership could positively influence the moral values of employees in order to create business value for the organisation. To this end participants highlighted the importance of an established culture of value generation:

> **"…a values driven environment"; (Participant 03)**

starting right at the top executive level and being cascaded down to every end-user of a computer system. Moreover, it was suggested that individuals with corrupted belief systems, or attitudinal problems or malicious intentions, would be marginalised by the prevailing culture causing them to disassociate themselves from the organisation, as described in the following statement:

> **"So, your attitudes you can influence, intentions you can influence. People come with beliefs and it sort of linked to the bigger values, or value set of the organisation. So, people with unsavoury beliefs would probably not fit into this organisation and will disappear". (Participant 01)**

The behavioural beliefs, attitudes and intentions of end-users of IS are understood to be directly influenced through the perceptions created by the leadership/ owners of a particular IS. When end-users perceive that the leadership recognises a particular IS within the organisation to be a value generating tool, then they will, over time, begin to cultivate similar sentiments towards the system. In addition, there needs to be a mutual relationship between the strategy of the organisation and the information tools that are being introduced into the environment, to execute on the strategy. One divisional executive commented that:

> **"This took a lot of time on change management. We spent a lot of time getting the executives to talk about the future strategy of the financial institution and how the system was going to enable that future strategy so that it could actually change their beliefs". (Participant 06)**

In line with the foregoing section, six participants stressed the importance of executives leading by example. Executives should not be seen to be promoting a particular IS while at the same time criticising it, or disusing it. Executives' spheres of influence are perceived to be undermined if they do not display a level of consistency within all areas of responsibility and behaviour. Preaching to himself, an executive head observed that:

"I think what is quite important as well from a value user perspective is: you must practice what you preach. So, if your attitude or beliefs against that IS, or about that IS, is not correct, your employees are not going to buy into your story. So you need to make sure that you live the values that you want your employees to follow as well". (Participant 24)

In a similar vein a delivery manager stressed the fact that:

"If your leadership is not living those values or displaying those values, you can't expect the rest of the organisation to do that". (Participant 07)

One participant proposed that senior management cannot simply expect success by vocally instilling the desired beliefs, attitudes and intentions in lower level staff, without considering that:

"…their own behaviour will sort of mitigate, or prevent any employee to behave in an undesirable manner". (Participant 12)

A senior manager made the following statement in an attempt to drive home the foregoing point:

"If people see that you use the system in the same way that they do and you support the system in the same way that they do, definitely it will influence the attitude and the intention, definitely. But it's that: "All animals are equal, but some animals are more equal than others", if that slips in, you start eroding value… that belief around: "but if the boss doesn't do, why must I go to all of this trouble? I mean, what is this? How can I, I mean, his claims are being processed within two days and I have to wait four weeks for my petrol claim to be... I mean, this is not right, you know!". Then it starts perpetuating the wrong attitudes and the wrong intentions... it creates a disgruntled feeling and that feeling of unfairness and things like that". (Participant 04)

Moreover, influence is only perceived to be effective if the flow of communication and power runs, to some extent, bidirectional. End-users of IS want to know that their voice is heard all the way up the hierarchy to where the real decision makers address their concerns at the level of deliberation commensurate with the end-users' level of concern. Users want to know that pervasive passive disuse of a system will not straightway be labelled by management as an attitudinal issue, but that management will take the time to identify the root cause of the problem and address it accordingly:

> **"So if we have a result and there is some passive disuse happening or there's some frustration in the mix here then we have to understand how that evolved and how that came about". (Participant 18)**

It is also believed that once the executive have achieved the objective of putting a strong beliefs system in place, which regulates the attitudes of employees, they can move their focus away from recalcitrant type behavioural problems and focus on the more pervasive, yet less sinister activities commensurate with quiescent behaviour. Moreover, the participant held that once this was done the organisation would be set to:

> **"get the true productivity and opportunities out of the systems or IS". (Participant 19)**

This shift in focus should comprise an element of reason at every level within the organisation. While the business case is commonly cast at a high level and executives from different business units are presumed to catch the rationale driving the introduction of a new system; at the lower levels, where individuals will be expected to interact with the new system on a daily basis, the value proposition for the system may not be as clearly understood.

4.1.12 Change Management

Change management was held by many participants as a key component of the process of positively influencing individuals' beliefs, attitudes and intentions, as one participant noted:

> **"… if the change management piece is not there it would absolutely lead to an absolute misuse and it would end up impacting and the value could be eroded significantly". (Participant 06)**

The same participant emphasised that:

> **"The change management aspect is very, very important - how you learn, what message you send, how you resolve issues". (Participant 06)**

Timely and relevant training was proposed to be crucial elements in the change management value chain. One process specialist held that:

> **"…training also plays a very critical role to make people, system users, to believe and understand what the system is intended for, to develop good behavioural beliefs about the system, not the bad ones, and to also develop a good attitude towards using the system for its intended purpose". (Participant 20)**

A colleague echoed this sentiment advising that:

> **"Before one even implements this specific information solution one should be already discussing and having serious change management around behavioural beliefs, behavioural attitudes and behavioural intention, so that by the time you get to this, the solution will be used the way it was intended in the first place, and as much as possible buy-in was obtained from these people through leadership change, training and so on. So that when we get to this place, at the end, that the misuse and the IT impact can be minimised". (Participant 14)**

In line with the forgoing, participants, suggested that training should not only compose the technical upskilling of end-users' knowledge, but should also include softer issues, e.g. winning over the hearts and minds of the trainees towards the adoption and correct usage of the new system. Once end-users sense a genuine concern for their future wellbeing, they naturally respond positively towards training interventions.

> **"As a result of that, the training, we noticed that during the training people were more actively involved in the training. They were identifying issues, and I think the active abuse and the intentional sabotage will suddenly significantly be reduced". (Participant 06)**

Moreover, trainees should also be familiarised with the end-to-end value proposition that informed the decision to implement the particular IS. Failing to do this could create major problems as one divisional executive pointed out:

> **"… after repeated attempts of trying to train suppliers and users, they have not grasped end-to-end how to use the system, and that has shown us that this lack of understanding… has a clear impact on their belief that the system was the wrong thing to do, and therefore their attitude is: "Screw the system, let me do of-catalogue purchases and do invoice, only ordering, not use the procurement system". So, the unintentional misuse has, had an interesting side effect from a recent implementation of IS". (Participant 22)**

While training was seen to constitute a key part of the change management process, participants were quick to state that, while training was necessary it was not sufficient on its own to ensure acceptable adoption and usage of IS. Other component parts of change management that were highlighted by participants included the changing of individuals' beliefs, obtaining the necessary buy-in at an early stage (i.e. before the new system is delivered), winning their hearts and minds and then guiding them through a process of:

"… changing his or her mind for the greater good of the organisation". (Participant 02)

However, this can only be achieved if the system owners ensure that quality time is invested in the users during the change process. This requirement was captured in the following statement:

"The way you do that, in my view, is spending time with the users, understanding their problems with the application and potentially improving the process, and also making sure that users are properly trained". (Participant 24)

One general manager interviewed captured the sentiments of several of her peers when she designated business owners as the executive sponsors of change management and not the IS executives.

"… should be driven from a business perspective and not from an IT perspective, because as soon as it is driven purely from an IT perspective, it is seen as IT doing it to a business and immediately the beliefs and attitudes etc. are negatively influenced… the opposite, where you get a business executive sponsorship and involvement, and it is seen as a business imperative. People are actually much keener to actually be geared towards accepting the change and adopting new systems". (Participant 15)

Participants held the opinion that change management was about business leaders painting a picture for end-users of a future that looked more desirable than the present state. One executive emphatically stated:

"That is the one thing I am doing in the next rollout. I'm starting off with the business. I'm not going to push just the system, but I'm going to push the benefits, I'm going to push the beliefs, the benefits for them, the strategy and, in fact, not even me, they're going to push it and then I'll just be behind them, supporting". (Participant 06)

In addition, the question: "*What is in it for me?*"; should be anticipated and explicitly answered for every individual that is expected to make a behavioural shift in terms of his beliefs, attitudes and intentions towards a new, or any system. Moreover, the benefits of a new system should be endorsed by providing clear answers to the questions of: "*What am I loosing that I am fond of or familiar with?*", and: "*What am I gaining in its place that is better?*". These questions should be frankly discussed and answered if individuals' beliefs concerning the value of the new solution are to be correctly formed. If the individual forms a negative belief of a particular system, his negative frame of reference will inevitably also impact negatively on his attitude towards the system and reinforce his intention to engage the system in either a quiescent or recalcitrant manner. An executive, who had just prior to the interview implemented a core solution, described the process of painting an improved future for end-users as follows:

> **"So, this is not some party toy that the IT guys are trying to put into place, but it was part of the strategy that can enable them to deliver their long time business objectives, that will improve their salaries, that will improve their well-being... So we spent a lot of time on change management and talking to people and making people feel they're part of the solution". (Participant 06)**

4.2 Analysis (Qualitative)

4.2.1 Analysis of Feedback from Interviews

The following analyses were performed against the proposed Theoretical Technology Value Framework developed in Section 2.7. Participants' feedback to the "Value Eroding Potentiality of IT" supported the notion that end-users employ IS to equally create and destroy business value within organisations. Moreover, both quiescent and recalcitrant activities/ behaviours were underlined and validated by participants as contributing towards the erosion of value. In addition to endorsing the four value eroding activities, participants moreover, with the exception of one, confirmed the veracity of the comprehensiveness of four value eroding constructs. The individual, who argued for a possible fifth value eroding behaviour or activity grouping, was requested to provide an example of the proposed missing construct but ultimately conceded that he could not think of an acceptable example, at that point in time.

Participants comprehensively deliberated on and answered the first research question namely:

> **How does the introduction of an IS for the purposes of creating new or sustaining existing business value subsequently also inadvertently dissipate value?**

by persistently referencing the four value eroding constructs as typical end-user activities that contribute towards the erosion of business value. Examples relevant to each of the four value eroding behaviours were also frequently provided.

While the second research question was comprehensively answered in Chapter 2 of this thesis, question three namely:

> **How can the resultant value dissipating effects on the organisation be contextualised and qualified or quantified into an Archetypical Technology Value Model that accurately delineates the overall unintentional value destroying causes and effects of IS on organisations?**

was comparatively addressed in the various subsections under Section 4.1.

An analysis of participants' understanding of the causes of business value erosion, within the context of the utilisation of IS, displayed a distinctive prejudice towards both behavioural beliefs and behavioural attitudes as impacting more strongly on quiescent behaviours, whereas behavioural intention was seen to be causative of recalcitrant behaviours.

Validation of the consolidated feedback from the 31 interviews and subsequent corresponding adjustments to the Theoretical Technology Value Framework towards the consolidation of the Adjusted Technology Value Model, as depicted at the end of the chapter in Figure 4.8, was obtained from three of the 31 participants. The selection process followed a sample of convenience approach i.e., feedback was obtained from the first three participants who were willing to provide feedback, i.e. Ps-11, Ps-12 and Ps-14, refer to Table 4.3. The following memo and table was emailed to the three participants. The responses from the respective participants are provided in the last column of Table 4.3.

ANALYSIS OF RESULTS FROM INTERVIEWS

Kindly provide your agreement, or not, with the consolidated views of the participants, interviewed at your organisation, as presented in the statements below. You should refer to Figure 1 **(Denoting Figure 4.8 in this document)** *which provides a delineation of the Adjusted Technology Value Model which is a structural representation, incorporating the feedback from the interviews.*

TABLE 4.3 VALIDATION OF CONSOLIDATED FEEDBACK (AUTHOR)

No.	Statement	Agreement – Yes / No (Comments)
	Value Eroding Potentiality of IT	
1	The introduction of IS may not only create value for, but likewise inadvertently dissipate value from organisations.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
2	If IS users have negative opinions of the usefulness and usability of an IS, they are destined to end up using it for unintended purposes.	Ps-11: Yes Ps-12: Yes, however, this is dependent on the flexibility of the IS, i.e. if it can be used for unintended purposes. Ps-14: Yes
3	End-user may simply misuse an IS due to a lack of proper training.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
4	If business users perceive a new system to be valueless or business disruptive, a change management programme may need to be introduced to change these perceptions.	Ps-11: Yes Ps-12: Yes, including awareness of the new system functionality. Ps-14: Yes
5	Some users are seen to be opportunistically scouting the organisation's IS for weakness which they can exploit for personal gain.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
6	Some users may abuse the fact that the controls in an IS are lacking or may not be as good as it should be.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
7	IS may in extreme cases be utilised by disgruntled staff members to intentionally harm the organisation.	Ps-11: Yes Ps-12: Yes

		Ps-14: Yes
8	Behavioural Beliefs, Behavioural Attitudes and Behavioural Intentions act as influencers, informing the actions of end-users interacting with IS.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
9	While the object pursued by a user may be to create value by means of quiescent behaviour, the objective of users engaged in recalcitrant behaviour is pointedly different in that their motives are purely selfish and destructive to the goals of the organisation.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
10	The object pursued by a user may be to create value by means of quiescent behaviour, but due to the user's lack of skill, technical knowledge or the overall complexity of the system, he may inadvertently destroy value through the improper use of the system or dereliction of use.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
11	Conversely, the skills and knowledge of users engaged in recalcitrant behaviour are pointedly different from #10, in that they are able to expertly utilise information tools to pursue their self-serving and destructive ends, inhibiting the goals of the organisation.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
12	Users are influenced by their colleagues and senior leadership towards the creation of organisational value.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
13	Through the establishment of controls (*e.g. data validation, access controls etc.*), users are guided towards correct behaviour.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

Behavioural Beliefs (BB)		
No.	**Statement**	**Agreement – Yes / No (Comments)**
14	Beliefs in the model may be described as the qualities innate to an individual that informs his moral or ethical opinions or convictions, independent of the activity of interacting with an IS.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
15	Beliefs in the model may be described as an individual's beliefs towards an IS's usefulness and ease of use that ultimately determines system adoption and usage.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
16	Users perceive an IS to be either an ally or enemy, and if the latter, the IS needs to be avoided (passively disused) or destroyed (intentionally sabotaged) by the user.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
17	Behavioural beliefs and behavioural attitudes may inform a person's unintentional misuse and passive disuse.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
Behavioural Attitudes (BA)		
18	Behavioural attitudes influence both the two quiescent as well as recalcitrant behaviours.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

19	If a manger has a negative attitude towards a particular IS, his team may well adopt the same negative attitude.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
20	It is necessary that users display a positive attitude towards an IS if it is to be adopted and used.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
Behavioural Intention (BI)		
21	Behavioural intention is the salient contributor or influencer of end-user's value eroding behaviours.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
22	The exclusion of end-users from the end-to-end SDLC process will prevent positive positions of intention to be established with them.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
Interrelationship between BB, BA & BI		
23	As delineated in **Figure 1**, each one of the Behavioural constructs may influence, or be influenced by, each of the other two constructs.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
24	There may be a disconnect between the first two constructs i.e. "Behavioural Beliefs and Behavioural Attitudes" and the third construct i.e. "Behavioural Intention".	Ps-11: Yes Ps-12: Yes Ps-14: Yes

Unintentional Misuse (UM)		
No.	**Statement**	**Agreement – Yes / No (Comments)**
25	Some users believe that the work which they are doing is correct and value adding to the organisation. They are not aware that they are engaging in activities/ actions related to Unintentional Misuse.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
26	Management can correct Unintentional Misuse by positively altering the employee's BB and BA.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
27	While the consequences of an UM may not be as severe as for example that of Intentional Sabotage, the occurrence of UM is pervasive throughout organisations.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
Passive Disuse (PD)		
28	Disgruntled employees may not simply stop by engaging in passive disuse but will gravitate down the stack, towards both active abuse and, if the opportunity presents itself, intentional sabotage.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
29	Motivations underlying passive disuse may not necessarily only be ignoble but honourable as well.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
30	Time pressure is a contributing factor to the defaulting of end-users' preference towards the use of legacy systems.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

31	Once an individual has identified a work-around that is effective or efficient, albeit non-procedural, he will rationalise his improper behaviour over time to a degree where he has convinced himself that it is acceptable, at which point he will begin to promote the work-around amongst his peers.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
32	System controls and managerial oversight were identified as being effective counter measures to prevent, detect and correct PD.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
33	A measure to counter the occurrence of PD is the roll-out of an effective change management strategy where users are persuaded of both the business value that the new system will provide to the organisation as well as the value to their individual careers.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
	Active Abuse (AA)	
34	Negative Behavioural Beliefs, Behavioural Attitudes and Behavioural Intentions are all identified as possible sources of AA.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
35	End-users may abuse or even sabotage systems with <u>neutral</u> intent, e.g. not realising that their excessive use of the internet has an actual cost to the organisation.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
36	End-users may abuse or even sabotage systems with <u>good</u> intent, e.g. perceiving themselves to be self-appointed “end-user testers” of production systems.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
37	Users may develop an attitude of give-and-take towards their employers where they will play-off the use of their personal time and resources for the benefit of the company, against them making use of company time and resources for their own benefit.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
38	Users who abuse IS may very well also abuse resources beyond IS, including corporate resources and assets.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
	Intentional Sabotage	
39	While the occurrence of a successful in-house Intentional Sabotage event is remote, the impact of a single forceful attack could possibly cause the greatest harm to the organisation in terms of its value destroying capability.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
40	Unlike Unintentional Misusers and Passive Dis-users, Intentional Saboteurs are individuals who have extensive IS knowledge and skills.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
41	Intentional Sabotage may be driven by a person’s BB or some ideological motive.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
42	If an individual perceives his livelihood to be threatened by an IS, he may attempt to intentionally sabotage the system.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

Interrelationship between UM, PD, AA and Intentional Sabotage		
43	Given the right conditions e.g. end-users becoming hypercritical of a particular system, they may find themselves moving down the stack i.e. from UM towards Intentional Sabotage.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

Behaviour Corrected by Degree of Control		
No.	**Statement**	**Agreement – Yes / No (Comments)**
44	Control measures are useful in the prevention, detection and correction of undesirable behaviour, but of little value in addressing individuals' Beliefs, Attitudes and Intentions.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
45	Preventative controls are perceived to be more desirous than detective or corrective controls, as the latter are seen to be reactive and subsequently less effective.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
46	Where individuals are aware of a detective control, they may refrain from a particular improper activity simply because of the fear of being caught out, and not necessarily as a result of their beliefs and attitudes having been reformed.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
47	Some individuals will still engage in improper activities as their tolerance for engaging in risky activities is higher than that of their peers.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
48	If proper preventative controls are put in place, the individuals in #47 will refrain from undesirous activities simply because they do not have appropriate access rights to execute particular actions.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
49	Management oversight is perceived to be undermined if the manager does not display a level of consistency within all areas of responsibility and behaviour.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
50	The implementation of proper system controls are required to ensure Recalcitrant Behaviour (Active Abuse and Intentional Sabotage) does not negatively impact on the organisation.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
51	The effectiveness of system and management controls in the prevention of Unintentional Misuse and Passive Disuse is enhanced if employees' Beliefs, Attitudes and Intentions towards any new IS being implemented are positively influenced by management.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
Behaviour Corrected by Degree of Influence		
52	Quiescent behaviour (Unintentional Misuse and Passive Disuse) may be better mediated via the positive influence of colleagues and leadership.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
53	Technology is important but without the users to drive the systems, and effective leaders to guide the users, the unfortunate outcome would be a failed IS.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

54	Executive leadership can positively influence the moral values of employees in order to create business value for the organisation.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
55	Individuals with corrupted belief systems, or attitudinal problems or malicious intentions, would be marginalised by the prevailing culture causing them to disassociate themselves from the organisation.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
56	Behavioural Beliefs, Behavioural Attitudes and Behavioural Intentions of end-users of IS are understood to be directly influenced through the perceptions created by the leadership/ owners of a particular IS.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
57	Executives must lead by example, they should not be promoting a particular IS while at the same time criticising it.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
58	Users want to know that pervasive passive disuse of a system will not straightway be labelled by management as an attitudinal issue, but that management will take the time to identify the root cause of the problem and address it accordingly.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

Change Management		
No.	**Statement**	**Agreement – Yes / No (Comments)**
59	Change management is a key component of the process of positively influencing individuals' beliefs, attitudes and intentions.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
60	Timely and relevant training are crucial elements in the change management value chain.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
61	Training should not only compose the technical upskilling of end-users' knowledge, but should also include softer issues, e.g. winning over the hearts and minds of the trainees towards the adoption and correct usage of the new system.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
62	Trainees should also be familiarised with the end-to-end value proposition that informed the decision to implement the particular IS.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
63	While training is necessary it is not sufficient on its own to ensure acceptable adoption and usage of IS. Other component parts of change management that are highlighted by participants include the changing of individuals' beliefs, obtaining the necessary buy-in at an early stage (i.e. before the new system is delivered), and winning their hearts and minds.	Ps-11: Yes Ps-12: Yes Ps-14: Yes
64	Business owners are the executive sponsors of change management and not the IS executives.	Ps-11: Yes Ps-12: Yes

		Ps-14: Yes
65	Change management is about business leaders painting a picture for end-users of a future that looks more desirable than the present state. The question: "What is in it for me?"; should be anticipated and explicitly answered for every individual that is expected to make a behavioural shift in terms of his Beliefs, Attitudes and Intentions towards a new system.	Ps-11: Yes Ps-12: Yes Ps-14: Yes

While richness in the understanding of the interrelationships between the four value eroding behaviours remained somewhat elusive, a number of participants did however provide compelling arguments as to why certain preliminary value eroding behaviours may give rise to resultant destructive behaviours. Moreover, quiescent behaviours were more commonly believed to give effect to recalcitrant behaviours rather than the reverse, i.e. a movement down the modelled behaviour stack rather than upwards.

The views proposed for and against the value eroding behaviour, that was perceived to comprise the highest potential for value erosion, similarly provided compelling arguments for each one of the four value eroding behaviours. While the value eroding impact of the quiescent behaviours was conceded to be substantially lower than that of recalcitrant behaviours, proponents of these behaviours argued that the pervasiveness of these value eroding actions proved almost ubiquitous throughout the organisation. Conversely, advocates in support of recalcitrant behaviour as possessing the highest potential for value erosion, suggested that while Intentional Sabotage was seldom successful, the impact of even one major event could have catastrophic implications for the institution. Moreover, they argued that the frequency of active abuse was not as low as some would think and that one would need to consider both the direct as well as indirect (opportunity cost) value being eroded as a result of end-users engaging in this.

The four mitigants, classed under the groupings of Degree of Control and Degree of Influence, are seen to work in partnership as complementary constructs in the extenuation of both quiescent and recalcitrant behaviour. These mitigants reduce value erosion by either directly mitigating the negative effect of the four end-user behaviours or via positively influencing the three behavioural constructs, which in turn influence end-user behaviour. The Degree of Influence is perceived to bring about a positive change effect on both Quiescent Behaviour as well as the three behavioural constructs related to Behavioural Beliefs, Behavioural Attitudes and Behavioural Intention. Conversely, the Degree of Control construct is primarily understood to forestall recalcitrant behaviour.

4.3 Conclusion and Model (Qualitative)

4.3.1 Conclusion

From the foregoing analysis it is accepted that the Theoretical Technology Value Framework is deemed to provide an acceptably accurate representation of an environment in which IS are utilised by end-users to equally create and/or destroy organisational/ business value.

While all the constructs comprising the framework were qualitatively validated, various arguments exist for and against particular relationships, or not, amongst each of the constructs.

Comparing Figure 2.13 (Theoretical Technology Value Framework) to Figure 4.8 (Adjusted Technology Value Model) it is evident that participants were not in agreement as to the flow of Behavioural Beliefs towards both Behavioural Attitudes and Behavioural Intention, and the flow, in turn, from Behavioural Attitudes towards Behavioural Intention, and lastly the flow from Behavioural Intention as the solitary conduit towards end-user action. While some agreed with the foregoing order, others argued for the existence of direct causal links from the three respective behavioural constructs to the four respective value eroding behaviours in a many-to-many relationship.

The view that emerged as being the most commonly held, suggests that while there appears to be a tendency for Behavioural Beliefs and Behavioural Attitudes to display a closer relationship with the quiescent behaviours, and Behavioural Intention, in turn, to display a closer relationship with the recalcitrant behaviours, ultimately, any one of the three behavioural constructs may well function as a precursor to any one of the four value eroding behaviours.

Moving on to the relationships between the four value eroding behaviours, a number of participants argued against the existence of any kind of interrelationship between the constructs while others provided unique examples of instances where a specific primary behaviour could trigger a secondary behaviour.

Finally, the overall conclusion drawn from the analysis of the mitigating constructs was that while all four constructs were perceived to be valid, the two constructs related to the Degree of Control, were seen to be more effective in mitigating value eroding behaviour, while the two Degree of Influence constructs were seen to be more lacking yet less costly in the prevention of behaviours that destroyed business value.

4.3.2 Adjusted Technology Value Model (Qualitative)

From the foregoing analysis, i.e. the validity of each of the constructs and the commensurate relationships that exist between each the constructs, the Theoretical Technology Value Framework was updated to reflect the arguments of the participants towards the Adjusted Technology Value Model, depicted in Figure 4.8.

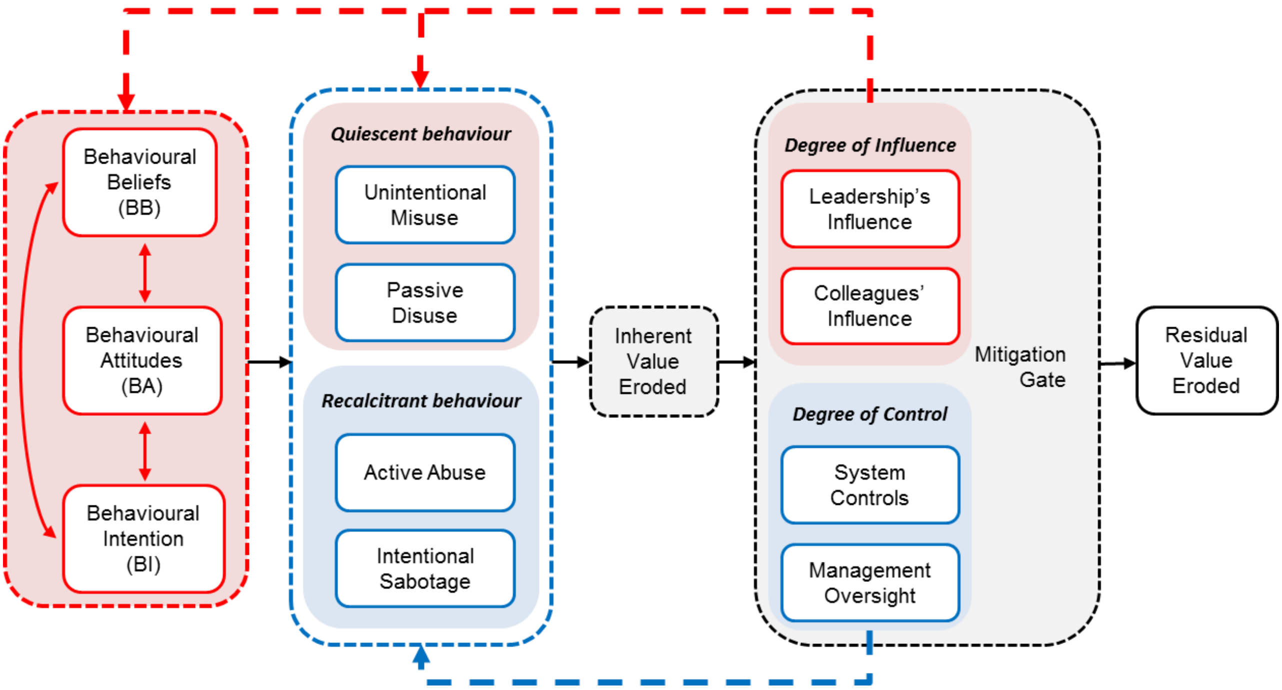
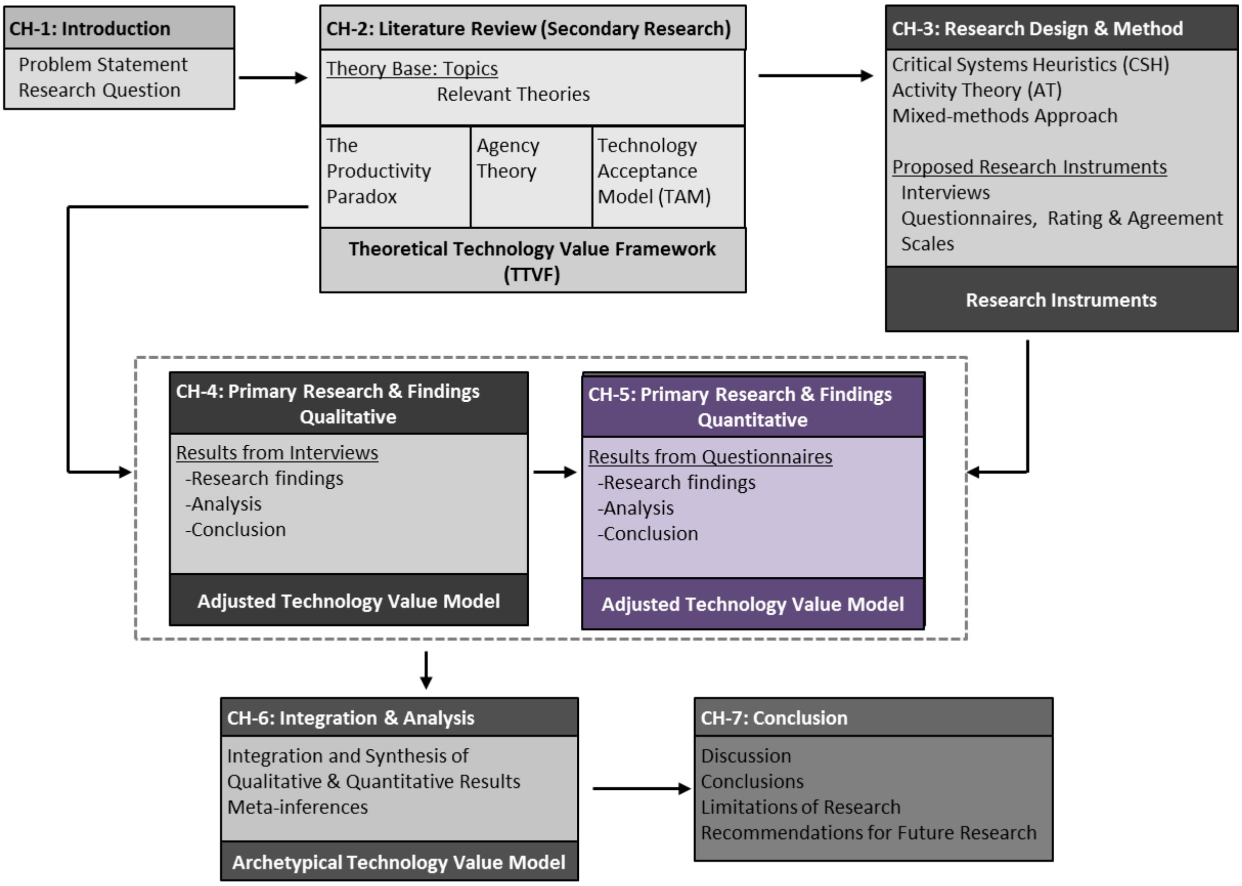


FIGURE 4.8 ADJUSTED TECHNOLOGY VALUE MODEL – QUALITATIVE (AUTHOR)

CHAPTER 5


CH-1: Introduction
Problem Statement
Research Question
CH-2: Literature Review (Secondary Research)
Theory Base: Topics
Relevant Theories
The Productivity Paradox
Agency Theory
Technology Acceptance Model (TAM)
Theoretical Technology Value Framework (TTVF)
CH-3: Research Design & Method
Critical Systems Heuristics (CSH)
Activity Theory (AT)
Mixed-methods Approach
Proposed Research Instruments
Interviews
Questionnaires, Rating & Agreement Scales
Research Instruments
CH-4: Primary Research & Findings Qualitative
Results from Interviews
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-5: Primary Research & Findings Quantitative
Results from Questionnaires
-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-6: Integration & Analysis
Integration and Synthesis of Qualitative & Quantitative Results
Meta-inferences
Archetypical Technology Value Model
CH-7: Conclusion
Discussion
Conclusions
Limitations of Research
Recommendations for Future Research

5. PRESENTATION AND ANALYSIS OF RESULTS FROM QUESTIONNAIRES

5.1 INTRODUCTION

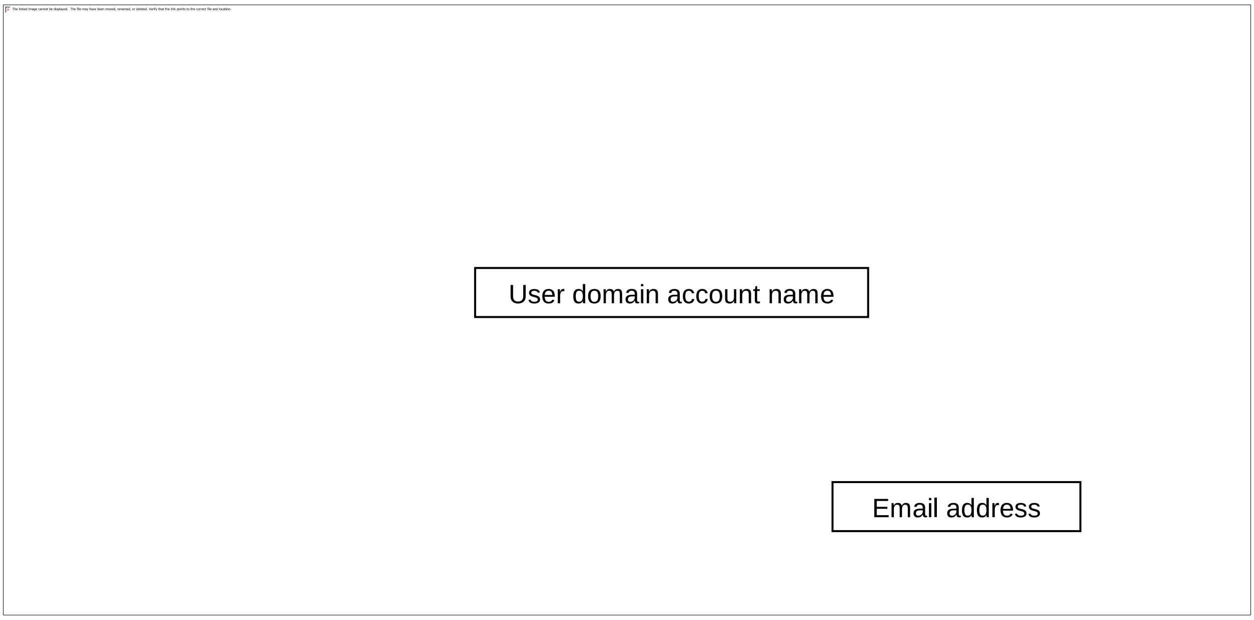
This chapter provides a structured overview of the quantitative data gathered by means of questionnaires and rating & agreement scales. The data from these instruments are statistically analysed by applying Structural Equation Modelling techniques, and measured against a set of hypotheses that address the research questions. From the analyses, the Theoretical Technology Value Framework is updated to reflect the results from the factor analyses towards an Adjusted Technology Value Model.

5.2 DATA COLLECTION METHOD AND PROBLEMS

Questionnaires were initially completed by 4 individuals, employed within the discipline of information technology, serving as a pilot group to test the survey tool (SurveyMonkey®) and to ensure that questions were comprehensible. Once validation in the form of a pilot test has been successfully completed, it is concomitantly assumed that the content validity of the measurement models analysed has been established. Within this context, content validity refers to: “The degree to which items in an instrument reflect the content universe to which the instrument will be generalized” (Straub, Boudreau, & Gefen, 2004). Generally, content validity is not easy to assess, since the commonly employed evaluation of this validity is judgmental and highly subjective (Straub *et al*., 2004). Accordingly, content validity has been controversial since its first geneses (Sireci, 1998). The pilot study identified three complications that were resolved as described below.

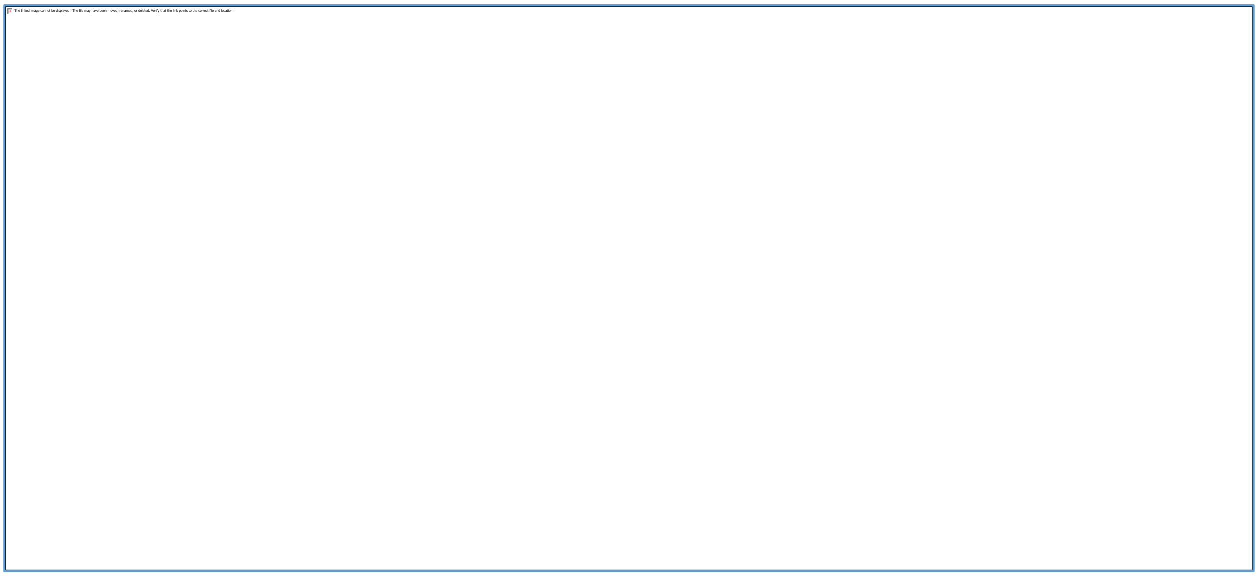
Firstly, the organisation’s firewall settings blocked end-user’s access (refer to block below) to the SurveyMonkey® site. SurveyMonkey® was catalogued in the organisation’s internet blacklist as an unsecure site. The author had to obtain a Risk Acceptance, approved by an IT Executive, in order to add the address below on the organisation’s internet whitelist for the duration of two months.

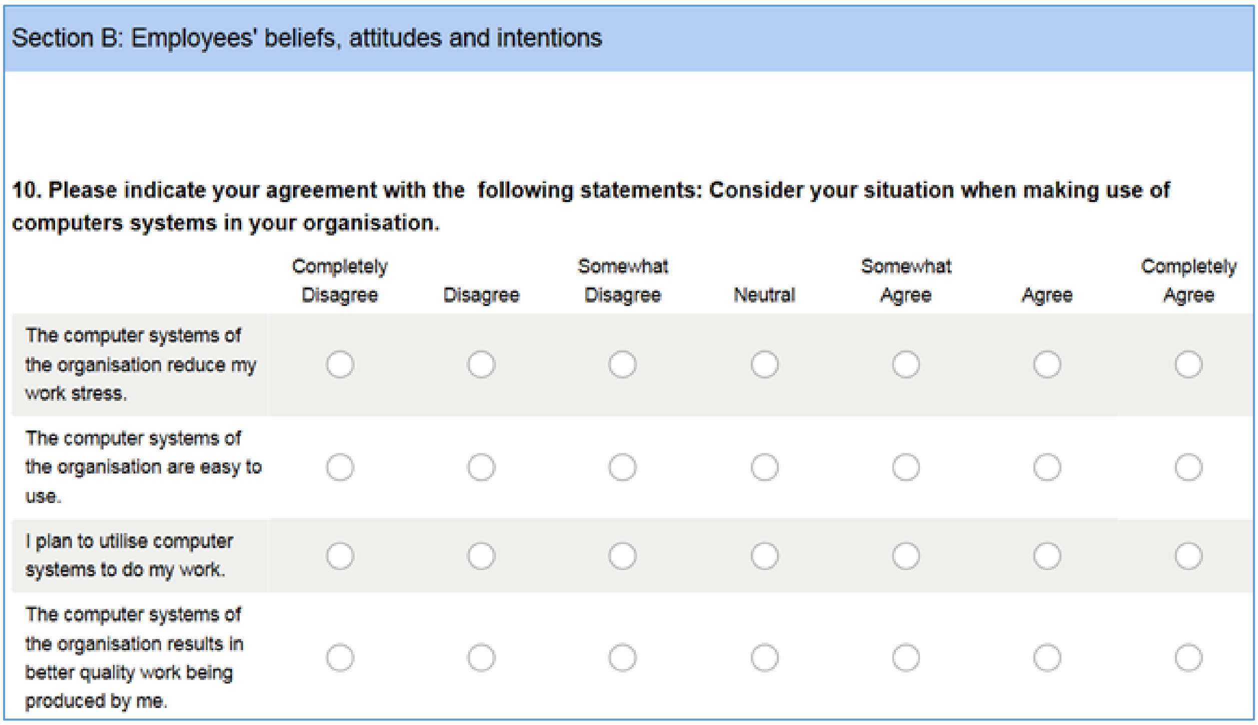
Link to survey: https://www.surveymonkey.com/r/CDG_PhD_Survey



The <u>second</u> challenge was caused by a proxy setting and resulted in the structure of the questionnaire being jumbled as depicted in Figure 5.1, and the survey tool allowing participants to skip mandatory questions. The following two feedback responses were received from the pilot group regarding problems with the survey tool or questionnaire:

1. "Your Radio buttons don't work."
2. "The landing page does not allow me to click."





Section B: Employees' beliefs, attitudes and intentions

10. Please indicate your agreement with the following statements: Consider your situation when making use of computers systems in your organisation.

	Completely Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Completely Agree
The computer systems of the organisation reduce my work stress.	○	○	○	○	○	○	○
The computer systems of the organisation are easy to use.	○	○	○	○	○	○	○
I plan to utilise computer systems to do my work.	○	○	○	○	○	○	○
The computer systems of the organisation results in better quality work being produced by me.	○	○	○	○	○	○	○

FIGURE 5.1 SCREENSHOT OF JUMBLED VS. CORRECT DISPLAY OF QUESTIONNAIRE DUE TO UPDATED CONFIGURATION OF THE ORGANISATION'S PROXY SERVER SETTINGS (AUTHOR)

The issue was brought under the attention of the Information Security team who promptly corrected the problem. The final hurdle presented itself in the form of Microsoft Internet Explorer version 11 incompatibility issues, which necessitated the inclusion of the italicised paragraph to the email message below (Table 5.1), sent out to the sample population of 4760 individuals. Table 5.2 displays the content of the two follow-up emails that were sent out towards the end of October and the beginning of November 2015.

TABLE 5.1 ORIGINAL EMAILS SENT OUT TO 4760 INDIVIDUALS IN RESEARCH POPULATION (AUTHOR)

Dear Colleague

Kindly assist me with my doctoral research by completing the short survey at the link below and **stand a chance to win R1000! Draw will take place on 10 November 2015 by the Head of IT Audit.** (This research has been sanctioned by "Name of IT Executive")

The questionnaire (**Sections A to H**) should take you approximately **20 to 30 minutes** to complete. You may forward/ email the link below to your personal email address and complete the survey at your convenience, e.g. tonight at home or over the week-end.

Kindly note that all responses are required to be submitted by Friday 30 October 2015!

Many thanks
Chris Grobler

If you encounter display problems with the survey, or cannot click on the first radio button, please follow the steps below:

1. *At the top right of you screen click on the round '**gear**' icon next to the star.*
2. *Choose 'Compatibility View Setting'*
3. *Click on 'Add'*
4. *Click on 'Close'*
5. *Wait for the page to refresh.*

LINK TO SURVEY

Terms & Conditions

The analysis of this research questionnaire is bound by the ethical stipulations and requirements of confidentiality, anonymity and data security, contained in the University of South Africa's (UNISA) Ethics Policy and Ethical Clearance Procedures. The salient **ethical concern** in this study is that of **participant anonymity**, especially in cases where feedback from participants may potentially discredit, incriminate or limit possible career advancement prospects of individuals or produce a reputational or strategic risk for the organisation. Feedback provided by respondents to questions is intended solely for the purposes of academic research. At no time will the researcher link feedback from participants to any particular individual. Moreover, all feedback, especially feedback that is considered as particularly sensitive or controversial will be naturalised (anonymised) within the broader context of the research findings to restrict any person of potentially retracing a response trail back to a specific participant in a group. The foregoing implies that measures have been taken to ensure that all reported/ published responses can only be traced back to a referent demographic group in as far as it was gleaned from within the specific group, and not a particular individual. Respondents are requested to answer all questions. However, if a respondent is not comfortable with the questioning process s/he may terminate his/her participation at any point in time and request that his/her responses not be included as part of the research. Kindly take note that the results of all questions will be statistically analysed for academic research purposes. All digital copies of the results will be stored for five years, with relevant metadata, on an encrypted device.

An incentive of R1000, as stated in the email and research questionnaire, was introduced in an effort to motivate staff members in the organisation to participate and complete the survey. Cobanoglu & Cobanoglu (2003) state that the use of incentives in surveys increased response rates significantly. They do however caution that the researcher should keep the following five ethical aspects in mind when offering an incentive.

1. The promised incentive needs to be distributed promptly. ***The author distributed the incentive within one week after the close of the survey.***
2. Every respondent must have an equal chance of winning the prize in the case of a prize draw. ***The author requested the Head of IT Audit to randomly draw a name from the 399 respondents.***
3. The conditions of the incentives need to be communicated to the respondents openly. ***The Rand amount of the incentive as well as the draw date was communicated to all candidates in the body of the initial email requesting their participation in the survey.***

4. Researchers need to make sure that the incentive is not something that may affect the responses in any way. ***The incentive was neutral in that it consisted of a monetary amount.***
5. The incentives should not be so valuable that respondents answer the survey merely to stand a chance of winning the prize. ***The amount of R1000, is not considered to be excessive by the author, yet it is deemed sufficient as incentive.***

Participants had to complete all 108 questions before they could gain access to the cell phone number to which they then texted their unique staff numbers in order to be considered for the lucky draw at the close of the survey period. To ensure transparency and independence, the Head of IT Audit, at the organisation, randomly picked the winning staff number.

Table 5.2 Follow-up Emails sent out to 4760 Individuals in Research Population (Author)

Dear Colleagues Many thanks for those of you who have completed the survey, apologies for receiving this reminder; it is due to the anonymity of the responses. If you have not yet completed the survey, please consider doing so before the Wednesday deadline as your opinion is really important. Best regards Chris

After various discussions with the target organisation's senior and executive management within the disciplines of Human Resources, Marketing, Ethics and Information Technology, the author was successful in procuring and additional 1896 email addresses from business units (BU) A to K, with the exclusion of BU F (refer to Table 5.4).

The latter unit comprise the Information Technology division of the organisation, and the author was able to obtain and subsequently send out emails to all 1864 IT staff within the unit. Table 5.3 provides a chronological flow of actions taken in the design, distribution and follow-up of the surveys. A total of 4760 emails were sent out, excluding the four individuals who assisted with the pilot survey.

TABLE 5.3 FOLLOW-UP EMAILS SENT OUT TO 4760 INDIVIDUALS IN RESEARCH POPULATION (AUTHOR)

Description of Action Taken	Date	Time-lapsed
Site (complete URL only) added to whitelist.	2015-09-22	0 days
Survey created and tested on SurveyMonkey® by author.		
Survey emails* sent out to four pilot respondents.	2015-10-01	9 days
Survey emails sent out to 1864 email addresses in BU[5]-F.	2015-10-16	15 days
Survey emails sent out to 1000 email addresses in BU-A to BU-K[6].	2015-10-19	3 days
Due to the low response rate, an email was sent to the Marketing Department of the organisation to request additional random email addresses to add to the sample population.	2015-10-23	4 days
Follow-up email sent out to 1864 email addresses in BU-F.	2015-10-27	4 days
Survey emails sent out to 1896 email addresses in BU-A to BU-K.	2015-10-29	2 days
Follow-up email sent out to 1896 email addresses in BU-A to BU-K.	2015-11-02	3 days
Close of survey.	2015-11-06	4 days
Draw of lucky winner of R1000 incentive by Head of IT Audit.	2015-11-10	4 days
Total time spent to create and run survey on SurveyMonkey®		**48 days**

* Emails were sent out in batches of 400 to 500 at as time.

Figure 5.2 delineates the withdrawal of respondents as the completion of the questionnaire progressed.

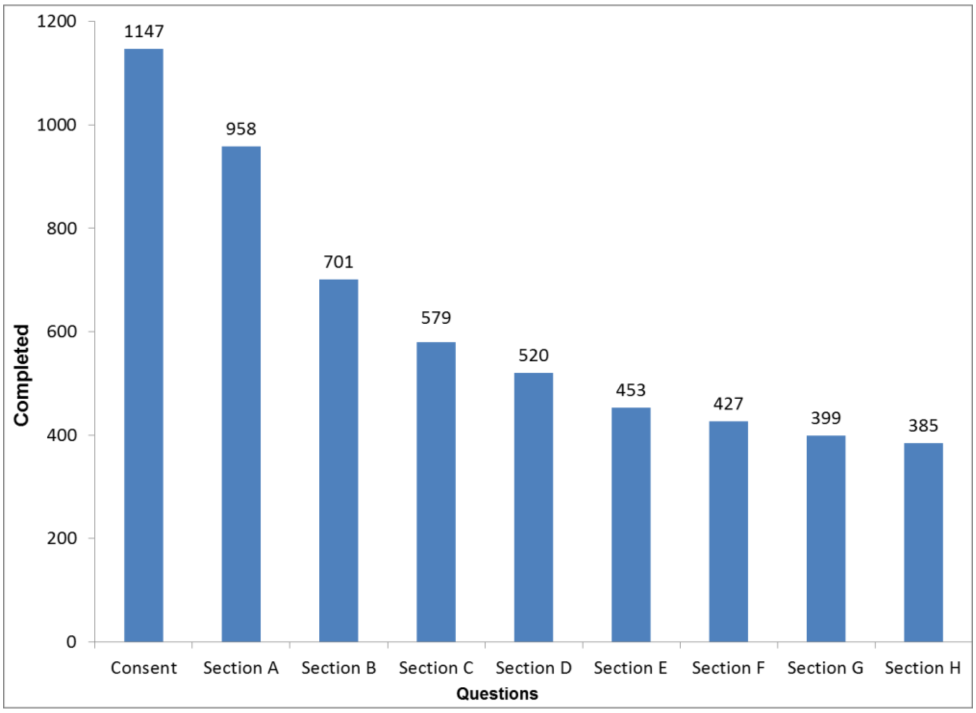


FIGURE 5.2 SCREENSHOT SHOWING THE DECREASE IN RESPONSES PER QUESTIONNAIRE SECTION (AUTHOR)

5 Business Unit-F
6 Excluding BU-F

The focus will now turn towards a description of the questionnaire and a cursory analysis of the metadata related to the eight demographic questions which comprised Section 1 of the questionnaire.

5.3 RESEARCH FINDINGS (QUANTITATIVE)

It was not the aim of the research questionnaire to single out or scrutinise any single response but rather to identify and expose hidden trends, themes, associations and causalities from the data.

5.4 ANALYSIS (QUANTITATIVE)

5.4.1 Analysis of Metadata

A number of challenges were encountered during the process of collecting employees' email addresses. The objective to solicit a representative sample from the population of the broader organisation could not be achieved. The employee email addresses, provided by the various custodians of these addresses, did not contain sufficient information regarding the representation of individual employees' specific BU within the larger organisation. The author subsequently had no indication of the email coverage per BU. Only once all the employees had responded, the percentage respondents per BU could be determined with reference to the total number of respondents i.e. 399. In general, small samples are inadequate for statistical methods because results from small samples tend to be statistically unstable due to sampling error (Field & Hole, 2003). As sample size increases the margin of error decreases for a particular level of confidence; at the 95% confidence level, a sample size of 399 will guarantee a maximum 5% margin of error (Sue & Ritter, 2007), which is considered adequate for purposes of the current study.

Moreover, while the total number of employees (28,860) within the greater organisation was initially known, the number of employees residing within each of the 11 business units of the organisation was only acquired from a database analyst once the feedback from all the respondents had been received. This information was utilised to calculate the percentage of staff represented within each business unit as depicted in the first column of Table 5.4.

Table 5.4 provides a breakdown of the number of emails that was sent out to each of the business units within the organisation, and the number of individuals who completed the questionnaire in each BU. Although 14 respondents did not complete Section H of the questionnaire in its entirety, the data was still included in the analysis as the questions in Section H did not impose a dependency on any one of the other sections. On average respondents took close to 45 minutes to complete the 108 questions contained in the questionnaire.

TABLE 5.4 QUESTIONNAIRE RESPONSES AND AVERAGE COMPLETION TIMES (AUTHOR)

Business Unit (BU)	Emails Sent*	Completed Sections A to G		Completed All Sections A to H	
		Respondents	Average Duration	Respondents	Percentage Completed
A		19	37:56	18	
B	288	35	44:39	33	
C		5	18:05	5	
D		31	51:22	31	
E		1	00:09	1	
F	1864	183	43:33	175	
G		6	19:55	6	
H	2335	77	49:49	74	
I		17	42:08	17	
J		5	20:53	5	
K	273	20	38:40	20	
TOTAL/AVE	**4760**	**399**	**43:51**	**385**	**8.1%**

* While emails were sent out to only four business units within the organisation, a number of respondents selected the business unit corresponding to their function and not the one in which they resided. For example, a Human Resource Manager residing in the Information Technology business unit may have chosen BU-G (HR) rather than BU-F (IT).

The first eight questions of the survey relate to demographic information. For each question the highest percentage is shown in **red bold text**. These questions and corresponding responses follow in the tables below. From question one, refer to Table 5.4, it is evident that the respondents were evenly balanced in terms of gender.

TABLE 5.5 GENDER QUESTIONS POSED (AUTHOR)

Please state your gender		Percentage
Male	199	49.9%
Female	**200**	**50.1%**
Grand Total	**399**	**100%**

Head office and regional office staff collectively comprised approximately 70 percent of the respondents at respectively 40 percent and 31 percent, refer to Table 5.6. While approximately half of the emails were sent to staff members employed in the branch network, many of these individuals do not have access to internet and could subsequently not complete the online survey.

TABLE 5.6 CAMPUS SITE QUESTIONS POSED (AUTHOR)

Where do you reside?		Percentage
Head Office	**158**	**39.6%**
Regional Office	124	31.1%
Branch Network	50	12.5%
Other	67	16.8%
Grand Total	**399**	**100%**

In terms of ethnicity, the majority of responses were obtained from White candidates (44%), followed by Black respondents (28%), with Coloured and Indian respondents comprising respectively 13 percent and 10 percent. Asian respondent comprised only 5 percent of the sample, as shown in Table 5.7.

TABLE 5.7 ETHNICITY QUESTIONS POSED (AUTHOR)

Please state your ethnicity.		**Percentage**
Asian	20	5.0%
Black	113	28.3%
Coloured	51	12.8%
Indian	41	10.3%
White	**174**	**43.6%**
Grand Total	**399**	**100%**

From Table 5.8 it is evident that the average age of respondents was pegged at around 40 years of age with approximately 48 percent of respondents falling below 40 years while the remaining 52 percent indicated that they were older than 40 years.

TABLE 5.8 AGE QUESTIONS POSED (AUTHOR)

Please state you age. (Years)		**Percentage**
< 20	0	0.0%
20 – 29	66	16.5%
30 – 39	124	31.1%
40 – 49	**129**	**32.3%**
50 – 59	66	16.5%
> 59	14	3.5%
Grand Total	**399**	**100%**

Thirty five percent of respondents were employed at either a specialist or middle management level while only 8.6 percent of respondents were grouped in the senior management or executive cadres, as depicted in Table 5.9. The remaining 56 percent of the candidates indicated that they were employed as either junior managers or served in non-managerial roles.

TABLE 5.9 LEVEL OF SENIORITY QUESTIONS POSED (AUTHOR)

Please state your level of seniority in the organisation.		Percentage
Executive Management	7	1.8%
Senior Management	27	6.8%
Technical Specialist	**70**	**17.5%**
Middle Management	**70**	**17.5%**
Junior Management	59	14.8%
Non-Management	166	41.6%
Grand Total	**399**	**100%**

It is noted from Table 5.10 that over half of the respondents (56%) had been with the organisation for less than 10 years, with another 12 percent indicating that they had been employed with the firm for less than 15 years. Just over 17 percent of the sample specified that they had been in the service of the organisation for longer than 20 years. In general terms the average duration of respondent's incumbency with the organisation, was accepted as sufficient to solicit valuable responses.

TABLE 5.10 EMPLOYMENT DURATION QUESTIONS POSED (AUTHOR)

How long have you been with the organisation? (Years)		Percentage
< 5	**116**	**29.1%**
5 – 9	108	27.1%
10 – 14	48	12.0%
15 – 19	58	14.5%
20 – 24	21	5.3%
> 24	48	12.0%
Grand Total	**399**	**100%**

The anomaly depicted in Table 5.11 relating to BU-F (Information Technology) may be ascribed to the IT staff's deeper interest in the research subject, and/or their solidarity with the author, who resides in the particular business unit. Conversely, the anomaly within BU-H (Retail), which is the largest business unit within the organisation, where only a comparatively small number of staff completed the survey, may be directly linked to the staff members' inaccessibility to the internet.

Table 5.11 Business Unit Questions Posed (Author)

5.2.7 In which business unit do you reside?		Percentage
BU – A (Staff represent **0.2%** of organisation)	19	4.8%
BU – B (Staff represent **7.2%** of organisation)	35	8.8%
BU – C (Staff represent **0.3%** of organisation)	5	1.3%
BU – D (Staff represent **3.0%** of organisation)	31	7.8%
BU – E (Staff represent **0.2%** of organisation)	1	0.3%
BU – F (Staff represent **6.4%** of organisation)	**183**	**45.9%**
BU – G (Staff represent **0.3%** of organisation)	6	1.5%
BU – H (Staff represent **71.7%** of organisation)	77	19.3%
BU – I (Staff represent **1.9%** of organisation)	17	4.3%
BU – J (Staff represent **0.3%** of organisation)	5	1.3%
BU – K (Staff represent **8.5%** of organisation)	20	5.0%
Grand Total	**399**	**100%**

From Figure 5.3 (and taking the forgoing paragraph into account) it is evident that a common pattern exists between the percentage of staff per BU that completed the questionnaires and the percentage of staff that is represented by the BU within the organisation. The sample was therefore accepted as sufficiently representative of the target population.

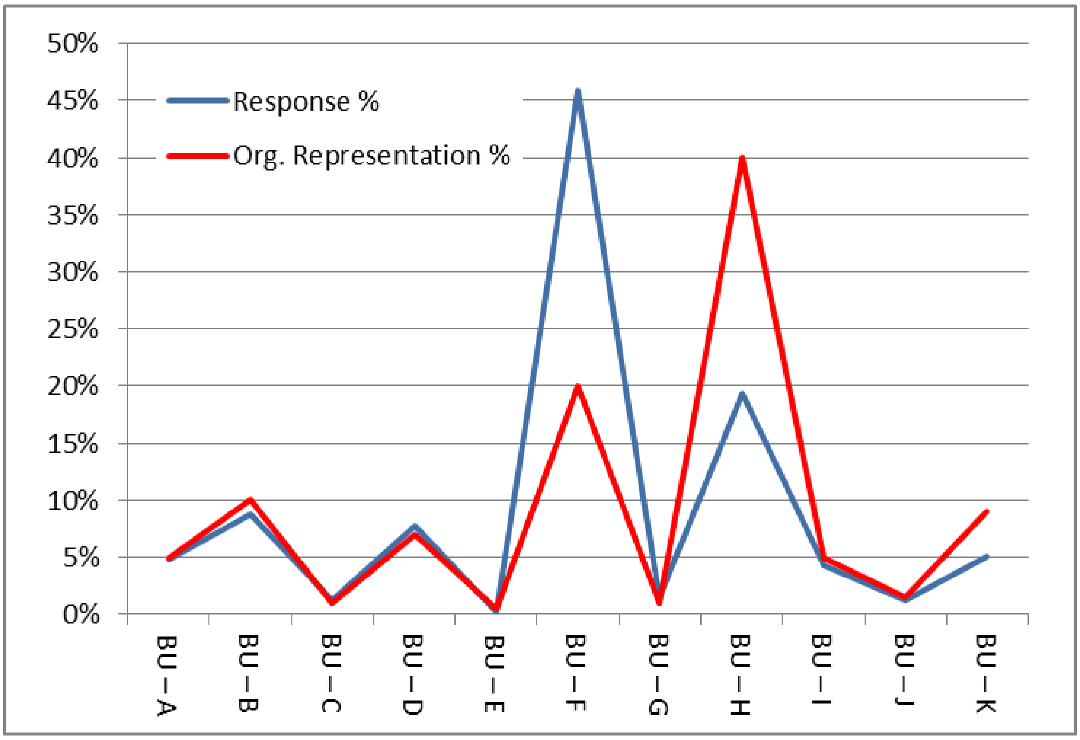


FIGURE 5.3 BUSINESS UNIT RESPONSE RATE PERCENTAGES COMPARED TO PERCENTAGE OF STAFF REPRESENTED PER BU IN THE ORGANISATION (AUTHOR)

It is evident from the responses to questions 8, refer to Table 5.12, that close to 90 percent of the respondents felt that they were suitably proficient in the use of computer systems, with upwards of 65 percent indicating a high or very high proficiency.

TABLE 5.12 IT PROFICIENCY QUESTIONS POSED (AUTHOR)

5.2.8 How would you rank your personal proficiency in the use of the organisation's computer systems related to you function?		Percentage
Low	2	0.5%
Medium Low	10	2.5%
Medium	32	8.0%
Medium High	93	23.3%
High	**158**	**39.6%**
Very High	104	26.1%
Grand Total	**399**	**100%**

A copy of the questionnaires used for the research, incorporating rating & agreement scales, is provided in Appendix J. For a graphical representation of the above eight tables, the reader is referred to Appendix K.

5.4.2 Validity

The validity of the theoretical constructs, informed by the Theoretical Technology Value Framework, was tested by applying the process of Exploratory Factor Analysis to the data collected from the 399 questionnaires. From the statistical analysis results the loading of items on each of the factors was established. An item loading is considered high if the loading coefficient is above 0.60 and low if the coefficient falls below 0.40 (Gefen, 2005). Factor loading in essence defines the correlation between a particular question (variable) and a factor that has been extracted from the data. Tables 5.13 to 5.15 provide a summary of the number of factors that were identified as valid for the model. The reader is referred to Appendix O for a comprehensive presentation of the EFA results.

The **Kaiser-Meyer-Olkin** measure was applied as a test of sampling adequacy. Results from the Kaiser-Meyer-Olkin measure typically varied between 0 and 1, where values closer to 1 are more desirous with a preference for values >> 0.50. Where the Kaiser-Meyer-Olkin was calculated as > 0.60 the sample was accepted as adequate and subsequently appropriate to conduct EFA. From Tables 5.13 to 5.15 it is evident that the results for all three sets of data provided Kaiser-Meyer-Olkin values of > 0.94.

The **Bartlett's Test of Sphericity** was applied to test the null hypothesis that the correlation matrix is an identity matrix, i.e. a matrix in which all of the diagonal elements are 1 and all off-diagonal elements are 0. The null hypothesis was rejected since the results from Bartlett's Test of Sphericity proved significant at << 0.05 for each of the three data sets.

Taken together, Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity complied with the minimum standards which must be passed prior to performing factor analysis.

From Table 5.13 (refer also to subsection B in Appendix J and Appendix L.1) it is evident that respondents did not make a distinction between the constructs of **Behavioural Beliefs** and **Behavioural Attitudes** as proposed in the Theoretical Technology Value Framework. These constructs were subsequently combined into one construct termed **Behavioural Beliefs and Attitudes**. Conversely, **Behavioural Intention** was perceived to be a separate construct. The two constructs were subsequently accepted as valid and included in subsequent statistical analysis steps. One item was disregarded due to the ambiguity created by cross-loading onto more than one factor.

Table 5.13 EFA for Items Q1.1 to Q4.5 (Author)

Total Variance Explained (Extraction Method: Principal Axis Factoring)							
Factor	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
EFA applied to questions Q1.1 to Q4.5							
1	11.580	57.898	57.898	11.230	56.151	56.151	9.947
2	1.979	9.893	67.791	1.656	8.278	64.430	9.055
The output shows 67.8% cumulative variance is explained by two factors. Two factors have Eigen values larger than 1, allowing the items/statements to be reduced to said two factors which may be used for the rotation.							

KMO and Bartlett's Test			**Comment**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.963**	KMO > 0.6 thus appropriate to conduct EFA
Bartlett's Test of Sphericity	Approx. Chi-Square	6 822.505	Since Bartlett's Test of Sphericity is < 0.05, Factor Analysis recommended to be suitable
	df	190	
	Sig.	**0.000**	

Pattern matrix representing questions Q1.1 to Q4.5			
# of Items	**Factor**		**Comments**
	1	**2**	
9	> 0.4	-	Items loading sufficiently on Factor 1
3	> 0.4	< 0.4	Items loading on both Factor 1 & Factor 2
7	-	> 0.4	Items loading sufficiently on Factor 2
1	> 0.4	> 0.4	Cross loading

From Table 5.14 (refer also to subsection C in Appendix J and Appendix L.2) it is evident that respondents made a distinction between the constructs of **Unintentional**

Misuse, Passive Disuse, Active Abuse and **Intentional Sabotage** as proposed in the Theoretical Technology Value Framework.

TABLE 5.14 EFA FOR ITEMS Q5.1 TO Q8.5 (AUTHOR)

Total Variance Explained (Extraction Method: Principal Axis Factoring)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
EFA applied to questions Q5.1 to Q8.5							
1	9.087	45.434	45.434	8.745	43.723	43.723	7.760
2	1.967	9.833	55.266	1.554	7.769	51.492	5.416
3	1.476	7.381	62.647	1.032	5.160	56.652	3.259
4	1.100	5.500	68.147	0.583	2.916	59.567	3.130

The output shows 62.6% cumulative variance is explained by three factors. Four factors have Eigen values larger than 1, allowing the items/statements to be reduced to said four factors which may be used for the rotation.

KMO and Bartlett's Test			Comment
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.946	KMO > 0.6 thus appropriate to conduct EFA
Bartlett's Test of Sphericity	Approx. Chi-Square	5 154.611	Since Bartlett's Test of Sphericity is < 0.05, Factor Analysis recommended to be suitable
	df	190	
	Sig.	0.000	

Pattern matrix representing questions Q5.1 to Q8.5

# of Items	Factor 1	Factor 2	Factor 3	Factor 4	Comments
7	> 0.4				Items loading sufficiently on Factor 1
3		> 0.4			Items loading sufficiently on Factor 2
1		> 0.4		< 0.4	Items loading on both Factor 2 & Factor 4
1		< 0.4			Item disregarded due to low loading
1			> 0.4		Item loading sufficiently on Factor 3
3	< 0.4		> 0.4		Items loading on both Factor 1 & Factor 3
1			> 0.4	< 0.4	Items loading on both Factor 3 & Factor 4
3				> 0.4	Items loading sufficiently on Factor 4

The four constructs were subsequently all accepted as valid and included in subsequent statistical analysis steps. One item was disregarded as a result of the irrelevance created due to its low loading.

From Table 5.15 (refer also to subsections E, F & G in Appendix J and Appendix L.3) it is evident that respondents made a distinction between the constructs of **System Controls, Management Oversight, Influence of Leadership,** and **Influence of Colleagues** as proposed in the Theoretical Technology Value Framework.

TABLE 5.15 EFA FOR ITEMS Q10.1 TO Q21.4 (AUTHOR)

Total Variance Explained (Extraction Method: Principal Axis Factoring)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
EFA applied to questions Q10.1 to Q21.4							
1	25.466	53.054	53.054	25.220	52.542	52.542	18.907
2	5.327	11.097	64.151	5.062	10.545	63.087	15.882
3	3.352	6.983	71.134	3.059	6.373	69.460	18.511
4	2.312	4.818	75.952	2.088	4.349	73.809	20.062

The output shows 64% cumulative variance is explained by two factors. Six factors have Eigen values larger than 1, allowing the items/statements to be reduced to said six factors which may be used for the rotation.

KMO and Bartlett's Test			Comment
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.958	KMO > 0.6 thus appropriate to conduct EFA
Bartlett's Test of Sphericity	Approx. Chi-Square	25 909.218	Since Bartlett's Test of Sphericity is < 0.05, Factor Analysis recommended to be suitable
	df	1 128	
	Sig.	0.000	

Pattern matrix representing questions Q10.1 to Q21.4

# of Items	Factor 1	Factor 2	Factor 3	Factor 4	Comments
12	> 0.4				Items loading sufficiently on Factor 1
12		> 0.4			Items loading sufficiently on Factor 2
12			> 0.4		Items loading sufficiently on Factor 3
12				> 0.4	Items loading sufficiently on Factor 4

The four constructs were subsequently all accepted as valid and included in subsequent statistical analysis steps. Refer to Appendix N for the EFA results. The discussion will now proceed to focus on the statistical reliability of each of the valid constructs.

5.4.3 Reliability

Further to the establishment of the validity of the ten constructs, each factor was subsequently refined by testing the reliability of all the items (statements) that loaded highly onto the particular factor. Reliability was verified via item analysis i.e. the internal consistency of each of the ten factors was established by demonstrating that each item loading onto the particular factor, measured only the particular factor and not also elements of one of the other nine factors. A Cronbach's Alpha, the factual measure of scale reliability (Gefen, 2003), of ≥ 0.8 was accepted as an indication of good reliability, while an alpha statistic of 0.5 to 0.6 is accepted as sufficient for exploratory research (Lewis, Templeton, & Byrd, 2005).

From Table 5.16 (refer also to Appendix M) it is evident that estimates of internal consistency, as measured by Cronbach's alpha, exceeded 0.8 for eight of the ten constructs. While the remaining two constructs could not achieve the required score for good reliability, the respective coefficients of 0.77 and 0.74 are deemed as acceptable. Moreover, all of the constructs were able to achieve the accruement of the required minimum of three items.

TABLE 5.16 CRONBACH ALPHA FOR CONSTRUCTS 1 TO 10 (AUTHOR)

Construct	Variables	Questions	# of Items	Cronbach Alpha	Reliability
1	Behavioural Beliefs & Attitudes	Q1.1 to Q4.5	12	0.955	Good
2	Behavioural Intentions		7	0.912	Good
3	Unintentional Misuse	Q5.1 to Q8.5	5	0.817	Good
4	Passive Disuse		3	0.772	Acceptable
5	Active Abuse		5	0.739	Acceptable
6	Intentional Sabotage		7	0.944	Good
7	System Controls	Q 10.1 to Q 21.4	12	0.955	Good
8	Management Oversight		12	0.973	Good
9	Leadership's Influence		12	0.978	Good
10	Colleagues' Influence		12	0.973	Good

5.4.4 Correlation

Due to the complexity of the Theoretical Technology Value Framework, a process of exploratory analysis was employed to identify correlating patterns within the data.

Spearman's rank correlation coefficient (Spearman's rho) was applied to determine the measure of statistical dependence between variable pairs. An assessment was conducted on how well the relationship between two particular variables was described using a monotonic function. It is accepted that in cases where there were no repeated data values, a perfect Spearman correlation of either +1 or −1 will occur, which is indicative of each variable being a perfect monotone function of the others. All p-values were set at the $p < 0.05$ level in order to be considered statistically significant.

Figure 5.4 and Figure 5.5 (refer also to subsection O.1 in Appendix O) delineates the associations between constructs using Spearman's correlation analysis. Variables (constructs) found to correlate significantly are shown as connected. The arrows representing the connections between the various constructs in Figure 5.4 are colour coded as follows: Green arrows represent correlation values above 0.60, while yellow arrows depict values from 0.40 to 0.57. Red arrows symbolise correlations from 0.19 to 0.36.

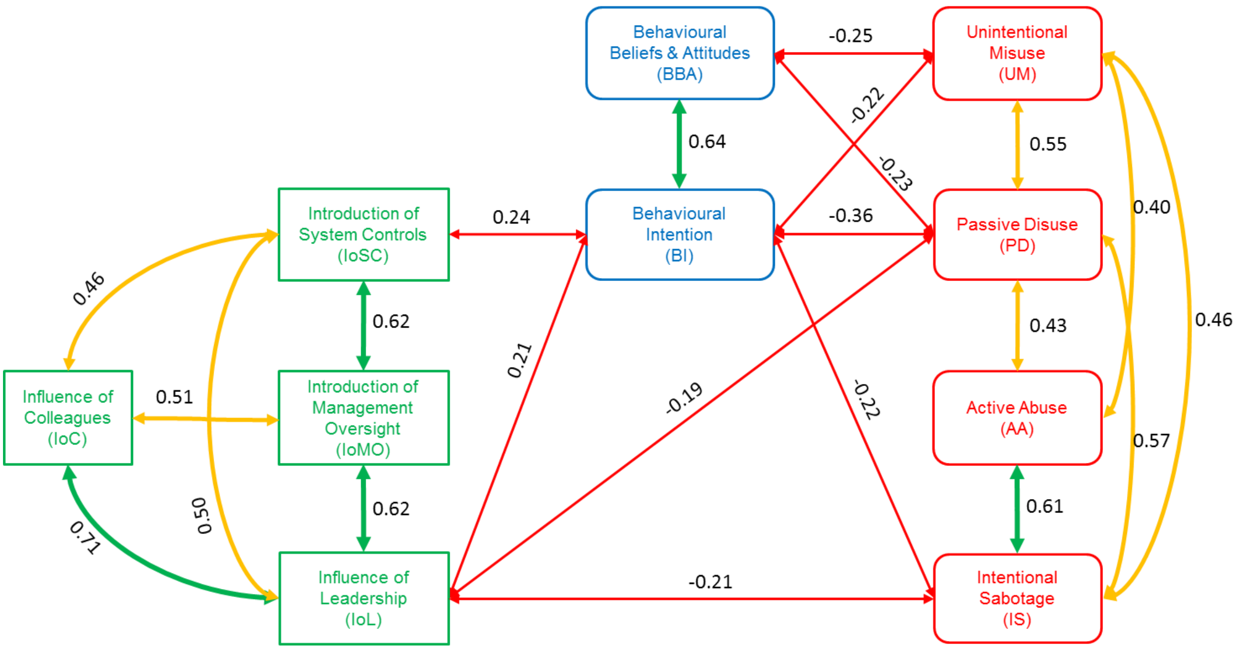


FIGURE 5.4 STRONG SIGNIFICANT SPEARMAN CORRELATIONS BETWEEN CONSTRUCTS (AUTHOR)

Negative values are indicative of the existence of inverse relationships between constructs, i.e. as the one factor increases the correlating factor commensurately decreases. It is evident that, while the four red Value Eroding factors correlated positivity amongst themselves, they correlated negatively with both the blue Behavioural and green Mitigation factors.

Figure 5.5 delineates correlating relationships that scored below 0.19, however since the p-values are < 0.05 these are nonetheless considered statistically significant. The six red dotted lines designate relationships that correlate negatively while the four black dotted lines represent positive correlating factor pairs.

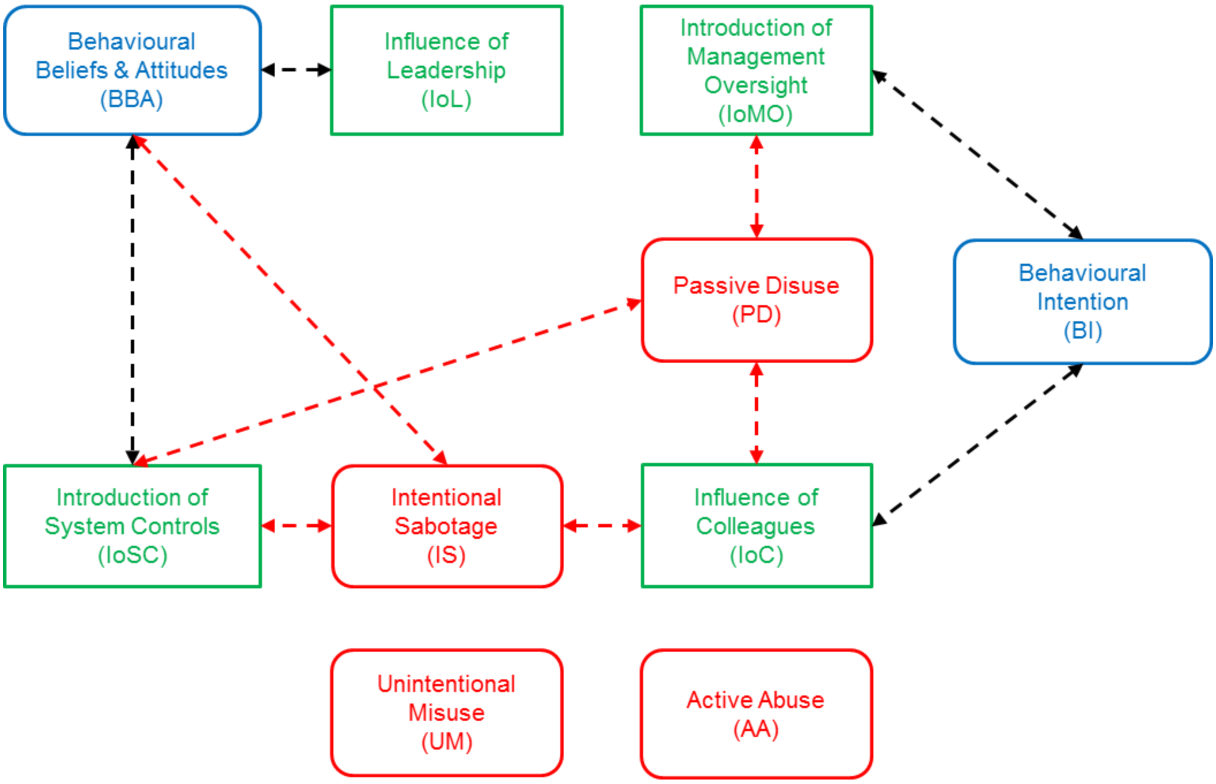


FIGURE 5.5 WEAK SIGNIFICANT SPEARMAN CORRELATIONS BETWEEN CONSTRUCTS (AUTHOR)

The columns displayed in Figure 5.6 represent the statistical mean for each of the constructs. As expected, the mean values relating to the value eroding behaviours (displayed in red) were significantly lower than that of the more positively orientated constructs. This is indicative of respondents' inclination to not engage, and also to perceive their colleagues as not engaging in value eroding behaviours. Comprehensive quantile results and summary statics are provided per construct in Appendix O (refer to subsections O.2 to O.11).

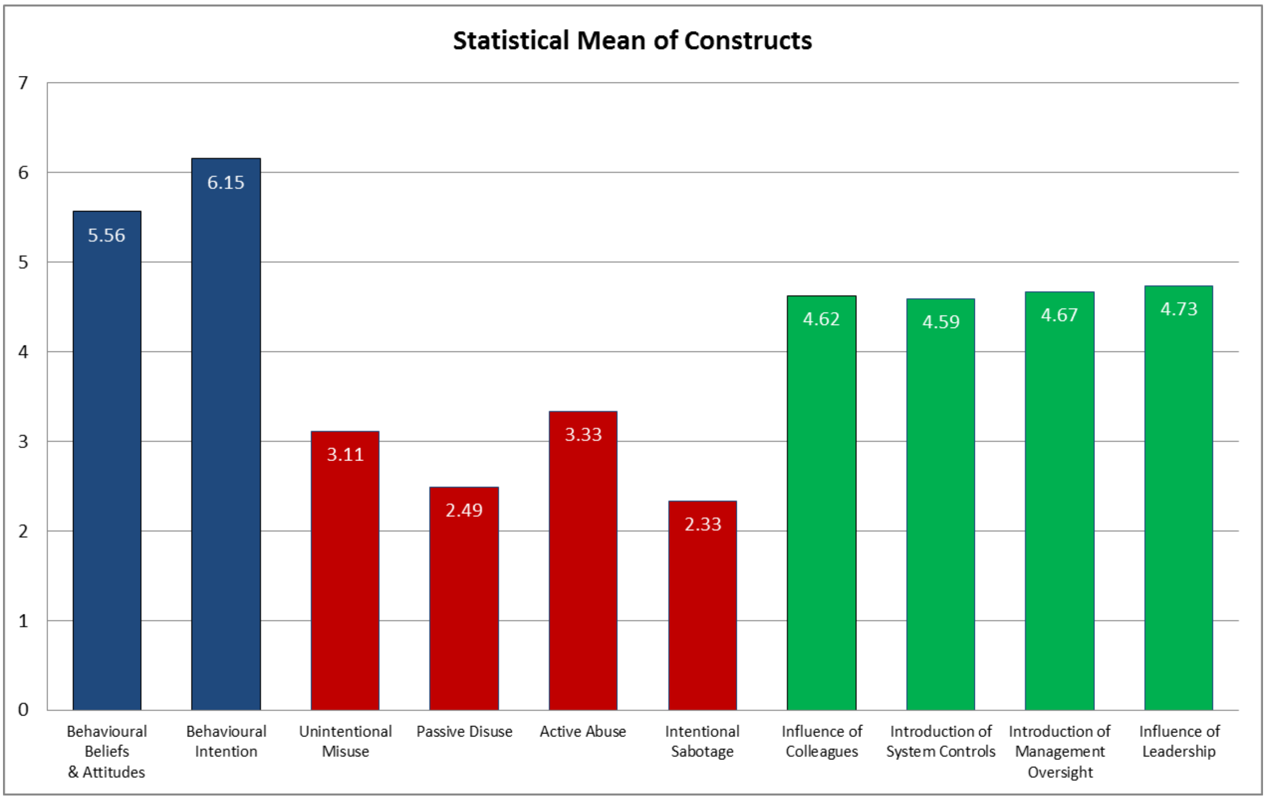


FIGURE 5.6 CENTRAL TENDENCY OF THE CONSTRUCTS AS REPRESENTED BY THE MEAN (AUTHOR)

5.4.5 Regression

Multiple Linear Regression was conducted, placing specific focus on the highly correlated factors identified in the foregoing section. This exploratory analysis technique typically recognised relationships between a particular dependent variable and a number of independent variables. A total of 12 response variables were considered, each correlating with between two and four explanatory variables as illustrated in Appendix P (refer to subsections P.1 to P.12) for comprehensive results of the 12 regression tests conducted.

The first step in the analysis comprised an evaluation of whether the regression model fit was statistical significant for each of the 12 models. Model significance was determined by conducting an F-test. This statistical test produced a requisite probability value (p-value) of < 0.05 to indicate model significance. It is evident from Table 5.17 that the regression model fit for 10 models proved to be statistically significant and for the remaining two, not.

TABLE 5.17 RESULTS FROM REGRESSION ANALYSIS (AUTHOR)

Section	Model	F Ratio	R^2 Adj	Prob>|t|	
L1	IoC = IoL + IoSC + IoMO	<0.0001*	0.537	IoL	<0.0001*
				IoSC	0.0012*
				IoMO	0.3229
L2	BBA = IoL + IoSC + IoMO	0.0535	0.012	IoL	0.0671
				IoSC	0.0986
				IoMO	0.0894
L3	BI = IoL + IoSC + IoMO	<0.0001*	0.049	IoL	0.0797
				IoSC	0.0007*
				IoMO	0.1855
L4	IoSC = BBA + BI	<0.0001*	0.048	BBA	0.1539
				BI	<0.0001*
L5	IoMO = BBA + BI	0.0219*	0.014	BBA	0.1385
				BI	0.0064*
L6	IoL = BBA + BI	0.0035*	0.023	BBA	0.7251
				BI	0.0062*
L7	UM = BBA + BI	0.0001*	0.041	BBA	0.0004*
				BI	0.6277
L8	PD = BBA + BI	<0.0001*	0.058	BBA	0.8472
				BI	0.0002*
L9	AA = BBA + BI	0.1015	0.006	BBA	0.0495*
				BI	0.0528
L10	IS = BBA + BI	<0.0114*	0.017	BBA	0.0776
				BI	0.0029*
L11	BBA = UM + PD + AA + IS	<0.0001*	0.075	UM	0.0003*
				PD	0.0099*
				AA	0.0147*
				IS	0.0948
L12	BI = UM + PD + AA + IS	<0.0001*	0.060	UM	0.7088
				PD	<0.0001*
				AA	0.1813
				IS	0.9314

*Significant

Key:

AA - Active Abuse
BBA - Behavioural Beliefs & Attitudes
BI - Behavioural Intention
IoC - Influence of Colleagues
IoL - Influence of Leadership
IoMO - Introduction of Management Oversight
IoSC - Introduction of System Controls
IS - Intentional Sabotage
PD - Passive Disuse
UM - Unintentional Misuse

Anderson & Gerbing (1988) provide the following guidance to researchers when considering assessment of fit:

> "After estimating a measurement model, given a converged and proper solution, a researcher would assess how well the specified model accounted for the data with one or more overall goodness-of-fit indices… Convergent validity can be assessed from the measurement model by determining whether each indicator's estimated pattern coefficient on its posited underlying construct factor is significant (greater than twice its standard error)."

Since every model comprised two or more independent variables, the adjusted coefficient of determination namely R Square (R^2 Adj) was employed to establish the goodness of fit of the regression model on the data.

It is evident from Table 5.17 that 53.7% (R^2 Adj) of the variation in **Influence of Colleagues** (IoC) is explained by the regression model comprising **Influence of Leadership** (IoL), **Introduction of System Controls** (IoSC) and **Introduction of Management Oversight** (IoMO). Similarly, the variation in each of the other significant models was explained as depicted in the adjusted coefficient of determination (R^2 Adj) column.

Figure 5.7 provides a delineation of the results from Table 5.17 for the predictors that proved to be statistically significant (Prob>|t|).

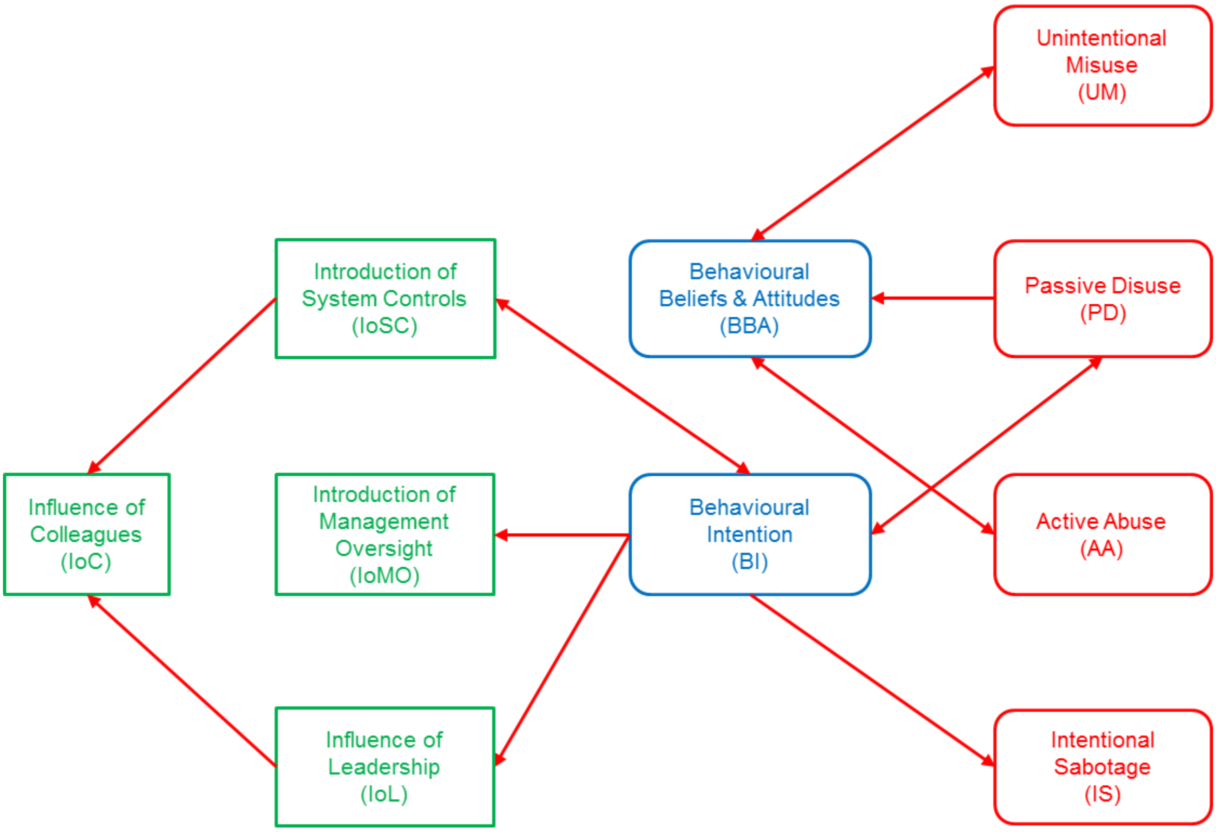


FIGURE 5.7 RESULTS FROM REGRESSION ANALYSIS: SIGNIFICANT (AUTHOR)

The direction of the arrows symbolise the influence of the independent variables on the dependent variables. Bidirectional flows were evidenced in four cases namely BBA – UM, BBA – AA, BI – IoSC, and BI – PD, supporting the notion that the particular factors have a reciprocal influence on each other.

Contrary to Figure 5.7, Figure 5.8 provides an illustration of the predictors in Table 5.17 that were tested but proved to be non-significant and were subsequently disregarded.

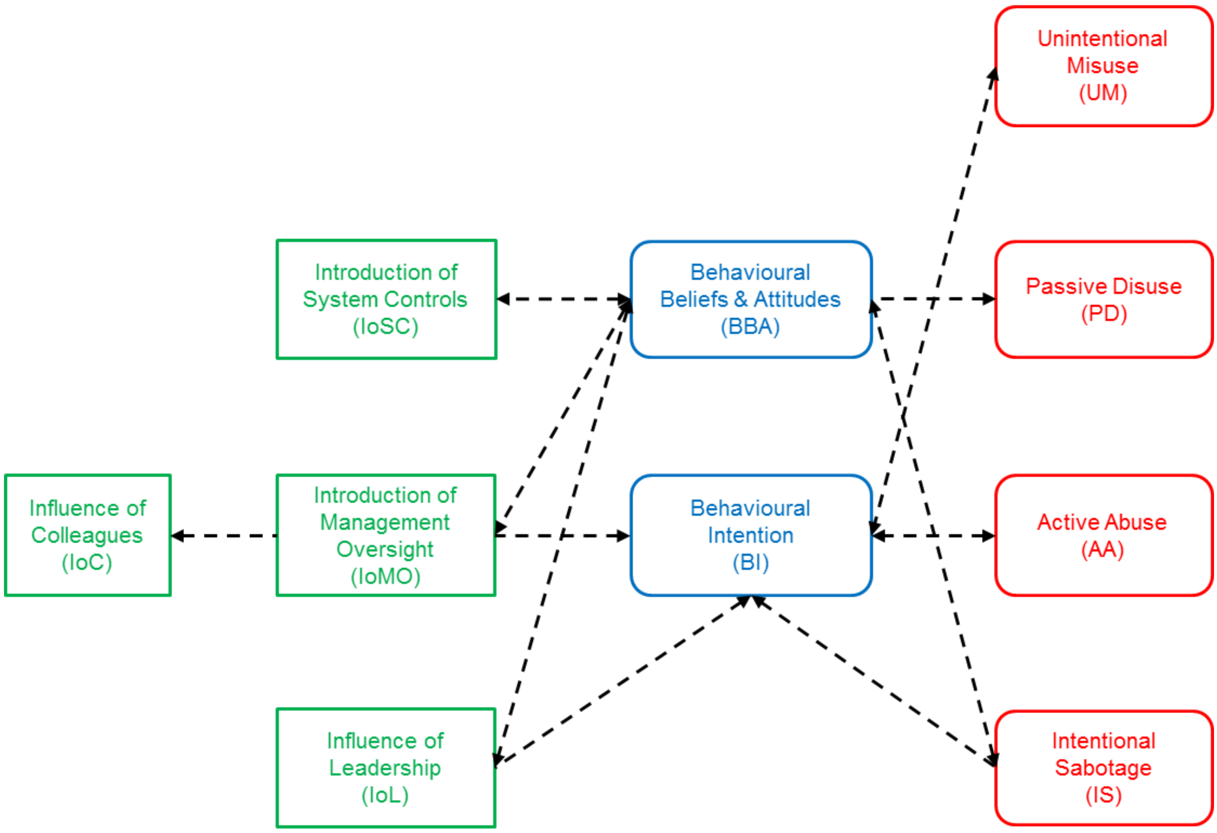


FIGURE 5.8 RESULTS FROM REGRESSION ANALYSIS: NON-SIGNIFICANT (AUTHOR)

5.4.6 Results from Structural Equation Modelling

While Exploratory Factor Analysis (EFA) was applied to identify the underlying factor structure, establishing the value sustaining vs. value eroding dimensions observed in the studied technology driven organisation, Confirmatory Factor Analysis (CFA) was utilised to evaluate constructs associated with two *a priori* technology acceptance component models based on respectively the Technology Acceptance Model and Wixom & Todd Research Model. SPSS was once more employed to statistically analyse the data informing the structural equation model.

Urbach & Ahlemann (2010) describe a structural equation model as consisting of different sub-models namely the Structural Model (SM) and Measurement Model (MM). Care was taken to ensure that the measurement model was grounded on auxiliary theory. The Structural Model (Inner Model) comprises the relationships between the Latent Variables (LVs) that were derived from theoretical considerations grounded within the literature. Edwards & Bagozzi (2000) endorse the claim from Blalock(Jr),

(1985) that, “without this auxiliary theory, the mapping of theoretic constructs onto empirical phenomena is ambiguous, and theories cannot be empirically tested”.

Latent Variables were defined as either Independent LVs (Exogenous Variables) or Dependent LVs (Endogenous Variables). For each of the LVs within the structural equation model, a Measurement Model (Outer Model) was subsequently defined. These models embody the relationship between the empirically observable indicator variables and the LVs.

Since LVs are unobservable and cannot be directly measured, researchers are required to make use of observable and empirically measurable indicator variables (manifest variables) to estimate LVs in the model (Bentler, 1980). Thus, the relationships can be analysed between theoretical constructs, such as intentions, perceptions, satisfaction, or benefits, which are relevant to most disciplines. Consequently, the use of LVs have the potential to model theoretical constructs that are hard or impossible to measure directly (Urbach & Ahlemann, 2010). Bagozzi (1984) refers to the connections between the constructs and indicators or measures, as epistemic relationships or “rules of correspondence”.

The Structural Equation Modelling, particular to this thesis, comprises a multivariate technique combining both measured variables (observed variables) represented by the green coloured mitigating constructs (Figure 5.9) and latent constructs (unobserved variables) represented by blue coloured behavioural and red coloured value eroding constructs (Suhr, 2006). In the Structural Equation Modelling (Structural Equation Modelling) analysis process, all factors were tested against all other factors through Confirmatory Factor Analysis. Structural Equation Modelling is commonly utilised in the examination of the process by which independent variables (the mitigating factors) are thought to affect dependent variables (the value eroding factors), directly, or indirectly through a mediator (the behavioural factors). All three paths are fit at once, in a single model as depicted on in Figure 5.9 (Iacobucci, 2010).

MULTIPLE MEDIATORS

While Baron & Kenny (1986) recommend the use of Structural Equation Modelling in assessing mediation, since it offers a reasonable way to control for measurement error, Preacher & Hayes (2004) propose that researchers consider the possibility of multiple mediators. They suggest that in most situations, it is unlikely that the effect of an independent variable on an outcome is transmitted by only one means. Moreover, they recommend that when multiple mediators are introduced, it is often more convenient, precise, and parsimonious to include all of the mediators in the same model as depicted on Plate C in Figure 5.10.

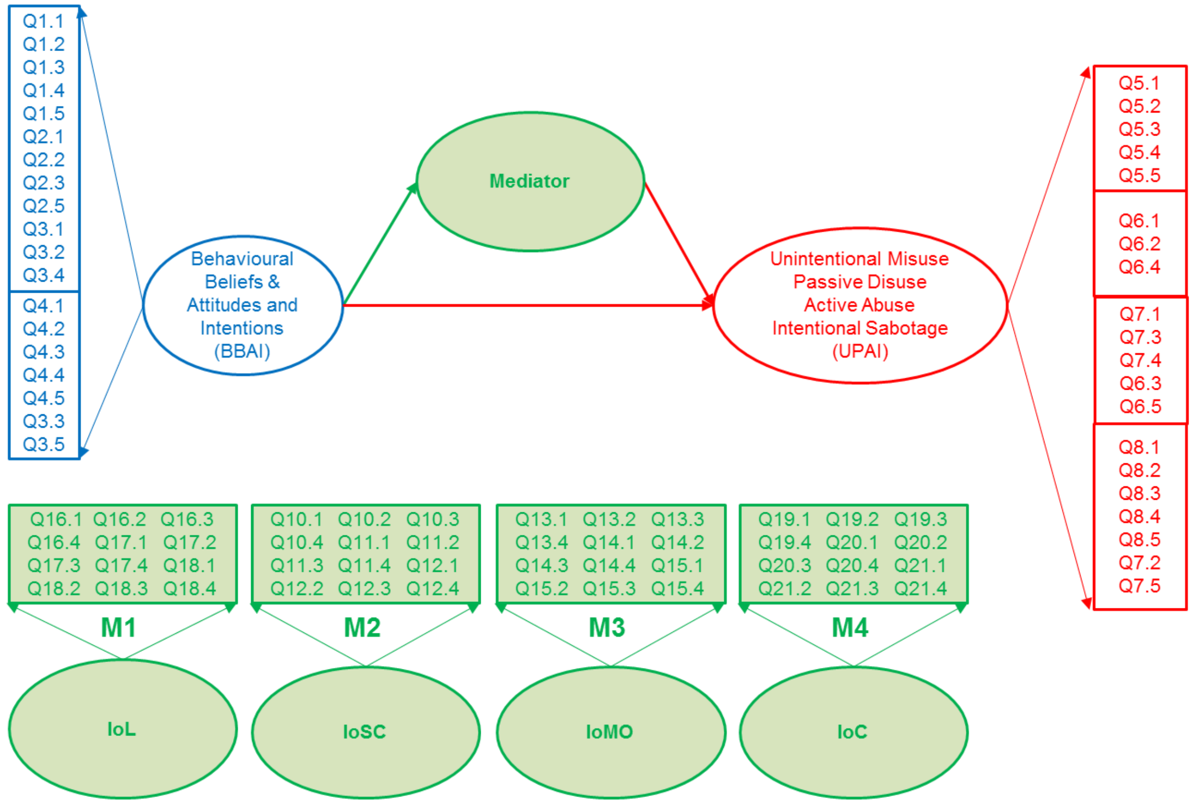


FIGURE 5.9 PROPOSED STRUCTURAL EQUATION MODELS 1 TO 4 (AUTHOR)

In line with the recommendation from Preacher & Hayes (2008), the four potential mediators namely (1) Influence of Leadership (IoL), (2) Introduction of System Controls (IoSC), (3) Introduction of Management Oversight (IoMO) and (4) Influence of Colleagues (IoC) were selected on the basis of theory. Since the Theoretical Technology Value Framework was proposed as a structural model for Structural Equation Modelling in Chapter 3, the marked differences between the proposed Structural Equation Modelling, delineated in Figure 5.9, and the Theoretical Technology

Value Framework (Figure 2.13) are subsequently clarified. The analysis of a Structural Equation Modelling requires the establishment of a simple model. Analyses up to this point have attempted to reduce the complexity inherent in the Theoretical Technology Value Framework. From Figures 5.4 and 5.7, it is evident that these models remain too complex for Structural Equation Modelling application as each still attains 10 interrelated constructs. A parsimonious measurement model was subsequently proposed as delineated in Figure 5.9 and described in the next passage.

A statistical concession was employed where the Mean (5.736) of the 19 items (indicator variables), in the measurement model, representing the independent latent variable denoted by the blue construct i.e. Behavioural Beliefs & Attitudes and Intentions (BBAI), in die structural model, were consolidated into a single representative construct. Similarly the Mean (2.770) of the 20 items, representative of the dependent latent variable denoted by the red construct i.e. Unintentional Misuse, Passive Disuse, Active Abuse & Intentional Sabotage (UPAI) were consolidated into a single representative construct. Next, the Mean of each of the multiple mediating constructs, denoted in green, i.e. IoL (4.726), IoSC (4.593), IoMO (4.672) and IoC (4.617), were inserted into the Structural Equation Modelling in succession and the Structural Equation Modelling analysed for each. In mediation models, multiple mediator variables can be specified to operate in parallel (refer to Panel C in Figure 5.10) or in sequence (Hayes, 2012). The following two sub-sections clarify the decision to disregard the Sobel test and apply the technique of Bootstrapping to the data.

SOBEL TEST

Preacher & Hayes (2008) recommended the use of the distribution of the product approach or Bootstrapping over the Sobel test or causal steps approach, on the grounds that the former have higher power while maintaining reasonable control over the Type I (false-positive) error rate. They furthermore recommend the use of Bootstrapping since it provides the most powerful and reasonable method of obtaining confidence limits for specific indirect effects under most conditions.

Hayes (2012), moreover, cautions that notwithstanding the popularity and wide use of the Sobel test, it remains challenging to justify and recommend it as the test assumes incorrectly that the sampling distribution of the product of the paths that define the indirect effect is normal. As an inferential procedure, the Sobel test is also less powerful than bootstrap confidence intervals.

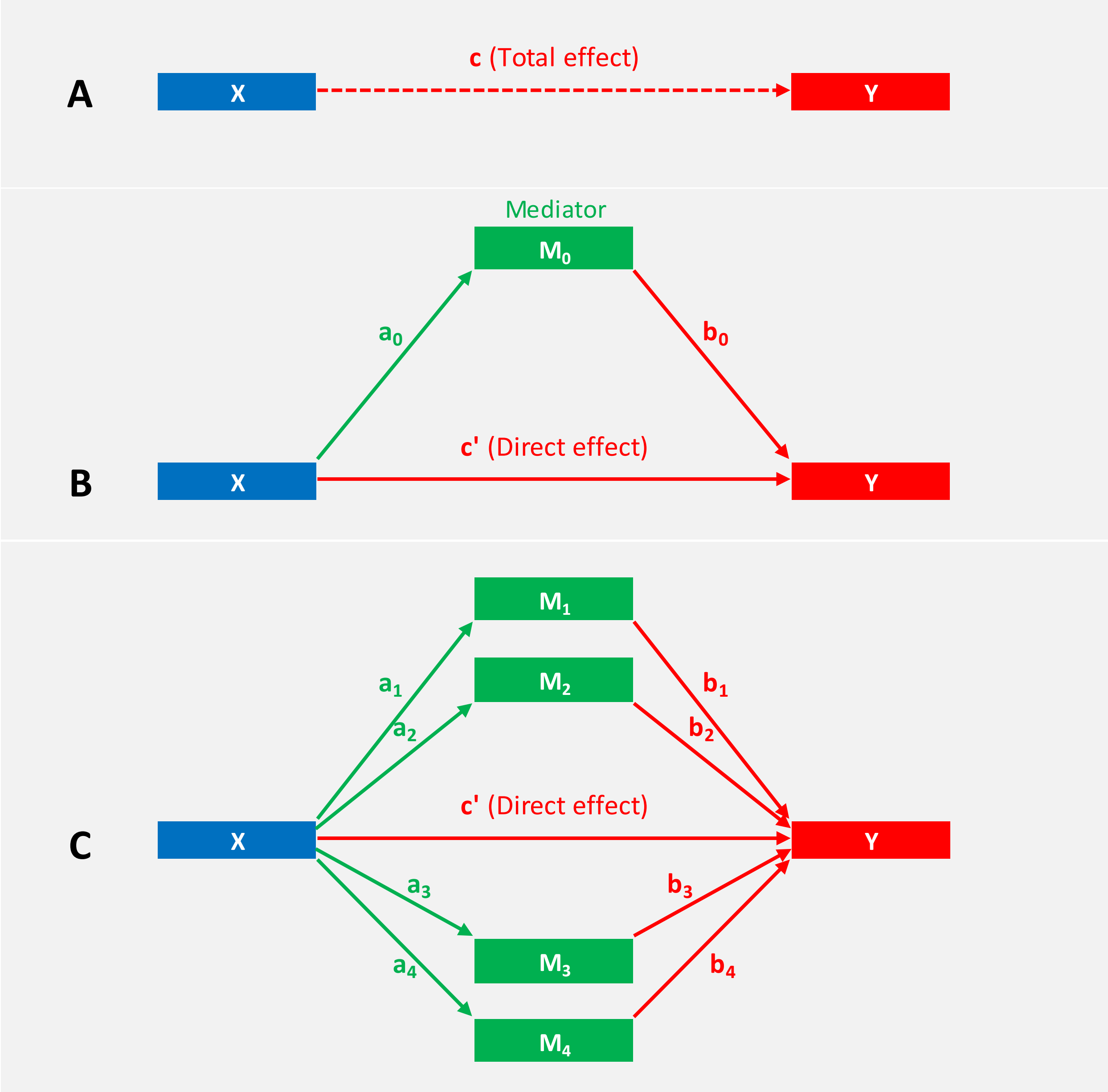
BOOTSTRAPPING

Hayes (2012) notes that recent recommendations suggest that the inference about the indirect effect should not be based on the statistical significance of the paths that define it (i.e. a_0 and b_0) but, rather on an explicit quantification of the indirect effect itself and a statistical test that respects the non-normality of the sampling distribution of the indirect effect. He moreover argues that although there are a number of different approaches available, asymmetric bootstrap confidence intervals are the procedure most widely recommended.

Preacher & Hayes (2004) moreover suggest that since the distribution of products is usually positively skewed, the symmetric confidence interval based on the assumption of normality will typically yield underpowered tests of mediation. They go on to propose an alternative approach namely Bootstrapping the sample distribution of a_0b_0 (Figure 5.10) and deriving a confidence interval with the empirically derived bootstrapped sampling distribution.

The proposed relationship between X and Y is hypothesised to be fully or partially mediated by four mediators namely M_1, M_2, M_3 and M_4 as delineated in Figure 5.10. The various components of the model in the figure are described as follows:

Predictor	**X**	**- Behavioural Beliefs & Attitudes and Intentions (BBAI)**
Mediator	**M_1**	**- Influence of Leadership (IoL)**
Mediator	**M_2**	**- Introduction of System Controls (IoSC)**
Mediator	**M_3**	**- Introduction of Management Oversight (IoMO)**
Mediator	**M_4**	**- Influence of Colleagues (IoC)**
Outcome	**Y**	**- Unintentional Misuse, Passive Disuse, Active Abuse and Intentional Sabotage (UPAI)**



(A) X affects Y, illustrating a direct effect via the c-path. (B) X is hypothesised to exert an indirect effect on Y through M0 via the a0b0-path. (C) X is hypothesised to exert indirect effects on Y through M1, M2, M3 and M4 via the a1b1, a2b2, a3b3 and a4b4 -paths.

Figure 5.10 Multiple Mediation Design with Four Mediators (author).

Preacher & Hayes (2004) furthermore point out that Bootstrapping is a nonparametric approach to effect-size estimation and hypothesis testing that makes no assumptions about the shape of the distributions of the variables or the sampling distribution of the statistic. They also claim that Bootstrapping has been suggested by others as a way of circumventing the power problem introduced by asymmetries and other forms of non-normality in the sampling distribution of a_0b_0. Lastly they note that Bootstrapping likewise produces a test that is not based on large-sample theory, suggesting that it may be applied to smaller samples with more confidence.

From the results of Table 5.18 it is evident that none of the data sets, representing the respective constructs, produced a normal distribution. Since Bootstrapping, as a nonparametric resampling procedure, is advocated as an additional method for testing mediation, that does not impose the assumption of normality on the sampling distribution (Preacher & Hayes, 2008), this procedure was employed as a preliminary step to Structural Equation Modelling analysis.

TABLE 5.18 RESULTS FROM STATISTICAL ANALYSIS (AUTHOR)

Description	BBAI		IoL		IoSC	
	Statistic	Std. Err.	Statistic	Std. Err.	Statistic	Std. Err.
Mean	5.736	0.047	4.726	0.071	4.593	0.071
95% Confidence Interval for Mean - Lower Bound	5.644		4.588		4.453	
95% Confidence Interval for Mean - Upper Bound	5.828		4.865		4.732	
5% Trimmed Mean	5.804		4.778		4.647	
Median	5.941		5.000		4.833	
Variance	0.872		1.985		2.013	
Std. Deviation	0.934		1.409		1.419	
Minimum	1.118		1.000		1.000	
Maximum	7.000		7.000		7.000	
Range	5.882		6.000		6.000	
Interquartile Range	1.118		1.833		1.833	
Skewness	-1.286	0.122	-0.580	0.122	-0.602	0.122
Kurtosis	2.766	0.244	-0.126	0.244	-0.225	0.244

Description	IoMO		IoC		UPAI	
	Statistic	Std. Err.	Statistic	Std. Err.	Statistic	Std. Err.
Mean	4.672	0.070	4.617	0.063	2.770	0.055
95% Confidence Interval for Mean - Lower Bound	4.535		4.493		2.661	
95% Confidence Interval for Mean - Upper Bound	4.809		4.740		2.878	
5% Trimmed Mean	4.721		4.675		2.708	
Median	4.917		4.833		2.600	
Variance	1.929		1.573		1.222	
Std. Deviation	1.389		1.254		1.105	
Minimum	1.000		1.000		1.000	
Maximum	7.000		6.667		7.000	
Range	6.000		5.667		6.000	
Interquartile Range	1.833		1.667		1.533	
Skewness	-0.596	0.122	-0.669	0.122	0.875	0.122
Kurtosis	-0.084	0.244	0.062	0.244	1.348	0.244

APPLICATION OF STRUCTURAL EQUATION MODELLING

Baron & Kenny (1986) identify a variable to be a mediator "*to the extent that it accounts for the relation between the predictor (i.e. BBAI) and the criterion (i.e. UPAI)*". They subsequently suggest that a variable, e.g. M_0 (Figure 5.10) may be considered a mediator if the following criteria are met:

1. X significantly predicts Y (i.e. $c \neq 0$)
2. X significantly predicts M_0 (i.e. $a_0 \neq 0$)
3. M_0 significantly predicts Y controlling for X (i.e. $b_0 \neq 0$)
4. The effect of X on Y decreases substantially when M_0 is entered simultaneously with X as a predictor of Y (i.e. $c' \ll c$)

Preacher & Hayes (2008) summarise the foregoing, explaining that these criteria essentially require paths a, b, and c to be significant and c' to be smaller than c by a nontrivial amount. Considering point one, (Hayes, 2012) suggest that modern thinking about mediation analysis does not require evidence of a total effect prior to the estimation of direct and indirect effects.

With reference to point four, Preacher & Hayes (2004) argue that "*models involving latent variables with multiple measured indicators inherently correct for measurement error by estimating common and unique variance separately*". In a later paper, they explain that collinearity, or redundancy among predictors (Mediators are predictors of Y) may lead the investigator to conclude that M_0 does not serve as a mediator when in fact it does, or even to conclude that M_0 serves as a mediator when it does not (Preacher & Hayes, 2008).

The lack of substantial mediation, as evident from the results in Tables 5.19 and 5.20, may well be partially attributed to the existence of collinearity between the four proposed mediators. However, from these tables it is also evident that the true indirect effects were estimated to lie either side of zero (i.e. LLCI < 0 and ULCI > 0) with 95% confidence (Table 5.19). Since zero is included the 95% confidence interval, is may be concluded that the indirect effects are indeed not significantly different from zero at $p < 0.05$ (Preacher & Hayes, 2004).

MEDIATIONAL MODEL

The causal variable was set as **X**, i.e. Behavioural Beliefs & Attitudes and Intentions (**BBAI**), and the outcome variable, or **Y** variable, as Unintentional Misuse, Passive Disuse, Active Abuse and Intentional Sabotage (**UPAI**). Finally, the mediators i.e. $\mathbf{M_1}$, $\mathbf{M_2}$, $\mathbf{M_3}$ and $\mathbf{M_4}$, represent respectively **IoL**, **IoSC**, **IoMO** and **IoC**. The causal mediational model is described as follows:

> The variable **BBAI** is presumed to cause $\mathbf{M_{1\text{-}4}}$, which in turn is presumed to cause **UPAI**. If there was complete mediation, then the causal effect of **BBAI** on **UPAI** controlling for $\mathbf{M_{1\text{-}4}}$ would be zero. For the estimates below to be valid, it is assumed that there is no measurement error in $\mathbf{M_{1\text{-}4}}$. Moreover it is assumed that there are no unmeasured common causes of $\mathbf{M_{1\text{-}4}}$ and **UPAI**. Finally, it is assumed that **UPAI** does not cause $\mathbf{M_{1\text{-}4}}$. (Kenny, 2014)

RESULTS

Descriptive Statistics (IoL)

There are a total of 399 observations. The means and standard deviations are presented in Table 5.18. The unexplained variance in IoL (Mediator) is equal to 1.961 (SD=1.400) controlling for BBAI (Causal Variable), with a multiple correlation for the regression equation of 0.122. The unexplained variance in UPAI (Outcome) is equal to 1.197 (SD=1.094) controlling for BBAI and IoL, with a multiple correlation for the regression equation of 0.160. For all analyses, alpha is set at 0.05.

The Four Steps (IoL)

The results of the four Baron & Kenny (1986) steps, which are summarized on Plate 1 of Table 5.19, are as follows:

1. The effect of BBAI on UPAI or path-c is equal to -0.148 (p=0.013), with a 95% confidence interval of -0.263 to -0.032, and a small effect size (R=-0.125). Step 1 has been passed.
2. The effect of BBAI on IoL or path-a_0 is equal to 0.183 (p=0.015), with a 95% confidence interval of 0.036 to 0.331, and a small effect size (R=-0.122). Step 2 has been passed.

3. The effect of IoL on UPAI controlling for BBAI or path-b_0 is equal to -0.079 (p=0.044), with a 95% confidence interval of -0.156 to -0.002, and a small effect size (R=-0.101). Step 3 has been passed.
4. The effect of BBAI on UPAI controlling for IoL or path-c' is equal to 0.133 (p=0.025), with a 95% confidence interval of -0.249 to -0.017 and a trivial mediation effect of 9.86%, and a small effect size (R=-0.122). Step 4 has failed.

In contemporary analyses, Baron & Kenny (1986) are no longer reported, but rather total, direct, and indirect effects are reported and tested (Kenny, 2014).

Huber weighting (Huber, 1964) was used and observations with small residuals were given more weight than observations with larger residuals. The results of the forgoing Baron & Kenny (1986) steps, using robust regression, are as follows:

1. The effect of BBAI on UPAI or path-c is equal to -0.240 (p<0.001), with a 95% confidence interval of -0.348 to -0.133. Step 1 has been passed.
2. The effect of BBAI on IoL or path-a_0, is equal to 0.272 (p<0.001), with a 95% confidence interval of 0.127 to 0.417. Step 2 has been passed.
3. The effect of IoL on UPAI controlling for BBAI or path-b_0 is equal to -0.105 (p=0.004), with a 95% confidence interval of -0.175 to -0.034. Step 3 has been passed.
4. The effect of BBAI on UPAI controlling for IoL or path-c' is equal to -0.211 (p<0.001), with a 95% confidence interval of -0.318 to -0.104. Step 4 has failed.

From the latter four steps it is evident that the robust methods yield essentially the same conclusions as ordinary least squares.

Indirect Effects (IoL)

The indirect effect of BBAI on UPAI or ab0 is equal to -0.015, with a smaller than small effect size (R^2=-0.012), and the direct effect is equal to -0.133. The percentage of the total effect of -0.148 (c' + a_0b_0) that is mediated is equal to 9.85 percent. The mediator is understood to be "proximal" in that standardized path-a_0, is greater than standardized path-b_0. Thus, IoL is "closer" to BBAI than to UPAI. The Sobel standard error is equal to 0.009, which makes the Z test of the indirect effect equal to -1.557 (p=1.881). Since the

Sobel test is not statistically significant, it was concluded that the indirect effect is not significantly different from zero.

The bootstrap estimated indirect effect (before bias correction) is -0.015 ($p=0.116$) with a standard error of 0.011 (Preacher & Hayes, 2008). The 95 percent bias-corrected bootstrap confidence interval (5000 trials) is from -0.045 to 0.001, and since zero is in the confidence interval, it is concluded that the indirect effect is not different from zero. In contemporary analyses, the bootstrapped test, and not the Sobel test, is reported.

Tests of Nonlinearity and Interaction

The results from the tests of nonlinearity and interaction follow: The interactive effect of BBAI and IoL on UPAI is 0.060 and is not statistically significant ($p=0.125$). The quadratic effect of BBAI squared on IoL is 0.052 and is not statistically significant ($p=0.256$). The quadratic effect of BBAI squared on IoL is -0.061 and is not statistically significant ($p=0.092$). The quadratic effect of IoL squared on UPAI is -0.058 and is statistically significant ($p=0.010$). There are concerns around nonlinear effects and either a data transformation or a nonlinear term might be advisable. The linear interactive effect of BBAI and IoL is not statistically significant ($p=0.125$)

OVERALL SUMMARY

Influence of Leadership (IoL)

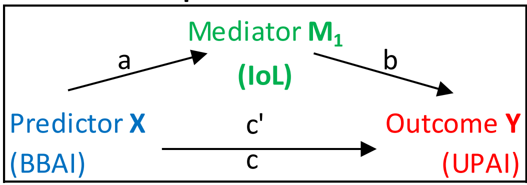
The direct effect from BBAI to UPAI equals -0.133 and is statistically significant ($p<0.05$). As BBAI increases by one unit, UPAI decreases by -0.079 units. The indirect effect from BBAI to UPAI equals -0.015 and is not statistically significant ($p> 0.05$). For the indirect effect, as BBAI increases by one unit, UPAI decreases indirectly via IoL by 0.015 units. There is no evidence of mediation since the indirect effect is not statistically significant.

The results of the four individual Structural Equation Models are summarised in Table 5.19 and the results for the combined model in Table 5.20. Results from standardized coefficients produced comparable results (in the same order of magnitude) to the unstandardized data sets as evident from Table 5.21.

The foregoing paragraphs describing the results for the mediator IoL is included as context to the tables and is not repeated for the each of the remaining mediators. From the analyses results, summarised in the aforementioned tables, it is evident that no mediating effects could be established for any of the proposed Mediators, i.e. M_1, M_2, M_3 or M_4.

TABLE 5.19 RESULTS FROM INDIVIDUAL MEDIATION MODELS (AUTHOR)

Plate 1: Descriptive Statistics - IoL

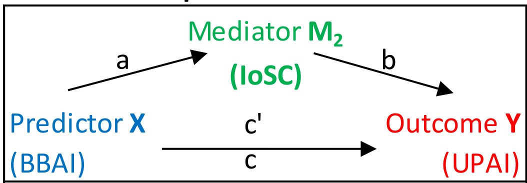


Variable	Mean	SD
BBAI (X)	5.736	0.934
IoL (M_1)	4.726	1.409
UPAI (Y)	2.770	1.105

Baron & Kenny Steps*

Step	Path	Estimate/Effect	LLCI	to	ULCI	CI <> 0	p	R-Sq	Beta
1	c	-0.148	-0.263	to	-0.032	Y	0.013	0.016	-0.125
2	a	0.183	0.036	to	0.331	Y	0.015	0.015	-0.122
3	b	-0.079	-0.156	to	-0.002	Y	0.044	0.010	-0.101
4	c'	-0.133	-0.249	to	-0.017	Y	0.025	0.013	-0.112
c-c' = axb =		-0.015	-0.045	to	0.001	N	0.116		

Plate 2: Descriptive Statistics - IoSC

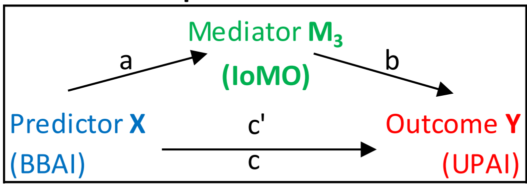


Variable	Mean	SD
BBAI (X)	5.736	0.934
IoSC (M_2)	4.593	1.419
UPAI (Y)	2.770	1.105

Baron & Kenny Steps

Step	Path	Estimate/Effect	LLCI	to	ULCI	CI <> 0	p	R-Sq	Beta
1	c	-0.148	-0.263	to	-0.032	Y	0.013	0.016	-0.125
2	a	0.199	0.050	to	0.347	Y	0.009	0.017	0.131
3	b	0.010	-0.067	to	0.087	N	0.803	0.000	0.013
4	c'	-0.150	-0.267	to	-0.032	Y	0.012	0.016	-0.126
c-c' = axb =		0.002	-0.015	to	0.022	N	0.789		

Plate 3: Descriptive Statistics - IoMO

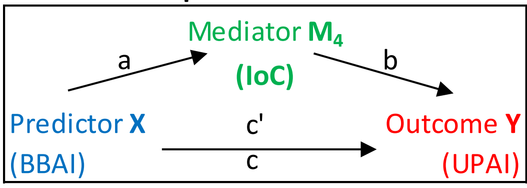


Variable	Mean	SD
BBAI (X)	5.736	0.934
IoMO (M_3)	4.672	1.389
UPAI (Y)	2.770	1.105

Baron & Kenny Steps

Step	Path	Estimate/Effect	LLCI	to	ULCI	CI <> 0	p	R-Sq	Beta
1	c	-0.148	-0.263	to	-0.032	Y	0.013	0.016	-0.125
2	a	0.071	-0.076	to	0.217	N	0.344	0.002	0.048
3	b	-0.005	-0.083	to	0.073	N	0.902	0.000	-0.006
4	c'	-0.147	-0.263	to	-0.031	Y	0.013	0.015	-0.124
c-c' = axb =		0.000	-0.013	to	0.008	N	0.982		

Plate 4: Descriptive Statistics - IoC



Variable	Mean	SD
BBAI (X)	5.736	0.934
IoC (M_4)	4.617	1.254
UPAI (Y)	2.770	1.105

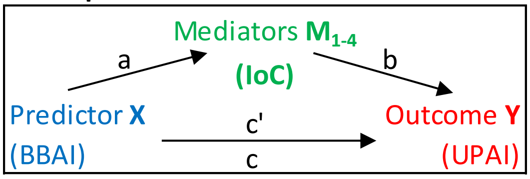
Baron & Kenny Steps

Step	Path	Estimate/Effect	LLCI	to	ULCI	CI <> 0	p	R-Sq	Beta
1	c	-0.148	-0.263	to	-0.032	Y	0.013	0.016	-0.125
2	a	0.062	-0.070	to	0.195	N	0.355	0.002	0.046
3	b	-0.084	-0.170	to	0.002	N	0.056	0.009	-0.095
4	c'	-0.142	-0.258	to	-0.027	Y	0.016	0.015	-0.120
c-c' = axb =		-0.005	-0.030	to	0.004	N	0.486		

*(Baron & Kenny, 1986)

TABLE 5.20 RESULTS FROM COMBINED MEDIATION MODEL (AUTHOR)

Descriptive Statistics - Combined Mediation Model (IoL + IoSC + IoMO + IoC)



M	Path	Estimate/Effect*	LLCI	to	ULCI	CI <> 0	p
M	c	-0.148 (-0.148)	-0.263	to	-0.032	Y	0.035
	c'	-0.140 (N/A)	-0.257	to	-0.022	Y	0.020
IoL	a_1b_1	-0.019 (-0.015)	-0.056	to	0.001	N	
IoSC	a_2b_2	0.011 (0.002)	-0.007	to	0.042	N	
IoMO	a_3b_3	0.004 (-0.000)	-0.004	to	0.030	N	
IoC	a_4b_4	-0.004 (-0.005)	-0.032	to	0.004	N	
TOTAL	ab	-0.008 (N/A)	-0.041	to	0.019	N	

*Effects in parenthesis denote results from individual analysis

TABLE 5.21 UNSTANDARDIZED VS. STANDARDIZED RESULTS (AUTHOR)

Plate 1: Descriptive Statistics - IoL

Path	Effect	
	Un-Std	Std
c	-0.148	-0.125
a	0.183	0.122
b	-0.079	-0.101
c'	-0.133	-0.112

Plate 2: Descriptive Statistics - IoSC

Path	Effect	
	Un-Std	Std
c	-0.148	-0.125
a	0.199	0.131
b	0.010	0.013
c'	-0.150	-0.126

Plate 3: Descriptive Statistics - IoMO

Path	Effect	
	Un-Std	Std
c	-0.148	-0.125
a	0.071	0.048
b	-0.005	-0.006
c'	-0.147	-0.124

Plate 4: Descriptive Statistics - IoC

Path	Effect	
	Un-Std	Std
c	-0.148	-0.125
a	0.062	0.046
b	-0.084	-0.095
c'	-0.142	-0.120

5.5 SUMMARY OF STATISTICAL ANALYSIS

While the results from the Structural Equation Modelling analysis proved inconclusive, the following is evidenced from the exploratory analyses preceding the aforesaid analysis:

1. The two Behavioural BAI Constructs exhibited a strong significant positive correlation, similarly the four Value Eroding Behaviour Constructs and the four Value Eroding Mitigation Constructs, each displayed strong significant positive correlations amongst their respective construct parts. The implication of the forgoing suggests that individual constructs in each of the three groupings contribute towards the overall intention of each of their particular construct groups. As an example, Active Abuse has a strong value eroding relationship with the other three value eroding constructs. Refer to Figure 5.2. Since correlation is not a proof of causality, Active Abuse cannot be claimed to cause any one of the other three value eroding constructs, or vice versa.
2. Without exception, the four Value Eroding Behaviour Constructs correlate negatively with the remaining six constructs in the model. As an example, Intentional Sabotage has an inverted value eroding relationship with Influence of Leadership, i.e. as the value of one construct increases the other will decrease. Again, correlation is not accepted as proof of causality.
3. From the regression analysis it is evident that more than 50 percent of the variation present in Influence of Colleagues is explained by respectively the Introduction of System Controls and the Influence of Leadership constructs. As an example, a positive value change in the Influence of Colleagues can be predicted from positive value changes in respectively the Introduction of System Controls and the Influence of Leadership constructs.

5.6 HYPOTHESES

Care was taken to ensure that the hypotheses addressed each of the research questions and were substantiated by the literature. Theories contained within the conceptual Theoretical Technology Value Framework are premised on the existence of *a priori* fixed relationships within phenomena as exposed by means of the literature review. These theories are to be identified and tested through hypothetico-deductive logic and analysis (Urbach & Ahlemann, 2010). Within this context, hypothetico-deductive logic describes the method of proposing a hypothesis, testing its acceptability or falsity by determining the consistency between the hypothesis' logical consequences and observed data.

Urbach & Ahlemann (2010) argue that the purpose of many research projects is to analyse causal relationships between variables. With this in mind, and substantiated by the literature, all of the hypotheses were formulated to forthrightly address one or more of the secondary research questions, as illustrated below:

Question 1: How does the introduction of an IS for the purposes of creating new or sustaining existing business value subsequently also inadvertently dissipate value?

Refer to paragraph following Question 3.

Question 2: What kind of Theoretical Technology Value Framework can be developed from the literature that generally delineates the overall unintentional value destroying causes and effects of IS on organisations?

Question 2 was answered in Section 2.7. This model was developed from the theory and positioned as a bespoke Theoretical Technology Value Framework. The Theoretical Technology Value Framework was then further adapted in line with the qualitative and quantitative analyses performed in Chapters four and five.

Question 3: How can the resultant value dissipating effects on the organisation be contextualised and qualified or quantified into an Archetypical Technology Value Model that accurately delineates the overall unintentional value destroying causes and effects of IS on organisations?

Questions 1 and 3 are partly addressed by the hypotheses below, representing the value being eroded from organisations as a direct result of the human activity.

H1. Unintentional misuse: End-users misapply organisational IS, either consciously or unconsciously, due to a lack of skill or negligence.

H2. Passive Disuse: End-users display passive-aggressive attitudes towards having to use particular IS prescribed by the organisation, causing them to avoid interaction with these.

H3. Active Abuse: End-users determinedly employ organisational IS for personal gain or to perform unauthorised transactions.

H4. Intentional Sabotage: End-users purposefully disrupt or damage IS of the organisation.

The results from the EFA (refer to Sections 5.4.2 to 5.4.5) support the hypotheses that respondents perceived the constructs of Unintentional Misuse, Passive Disuse, Active Abuse and Intentional Sabotage to be actual value eroding activities. The four constructs were subsequently all recognised as valid and therefore, the first four hypotheses were concomitantly accepted.

Question 4: To what extend may the Archetypical Technology Value Model be positioned as a lens for Information Technology driven organisations that can be generically applied to mitigate, minimise or eliminate the unintentional value destroying effects of IS on organisations?

Question 4 is partly addressed by the hypotheses below, representing the mechanisms put in place in an effort to stem the value being eroded from organisations as a direct result of the HCI activity.

H5. Influence of Leadership: The influence of leadership is effective in limiting value eroding behaviour of users making use of computers.

H6. Introduction of System Controls: The introduction of computer controls is effective in limiting value eroding behaviour of users making use of computers.

H7. Introduction of Management Oversight: The introduction of management oversight is effective in limiting value eroding behaviour of users making use of computers.

H8. Influence of Colleagues: The influence of colleagues is effective in limiting value eroding behaviour of users making use of computers.

The results from the EFA (refer to Sections 5.4.2 to 5.4.5) support the hypotheses that respondents perceived the constructs of Influence of Leadership, System Controls, Management Oversight, and Influence of Colleagues to be actual value eroding mitigants for Passive Disuse and Intentional Sabotage. However, no statistically significant relationships could be established between any of the proposed mitigants and Unintentional Misuse or Active Abuse.

With the inconsequential exception of the **Influence of Leadership** (Mediator 1) which partially mediated the effects of **UPAI** (9.85% mediation), the results from the CFA do not support the premises that respondents perceived the effects of System Controls, Management Oversight and Influence of Colleagues, to be true mediating constructs. However, constructs presenting potential value eroding mitigants are not required to be mediators in the true sense of the word, but simply to correlate negatively (with $p < 0.05$), in order to support the hypotheses that respondents perceived these constructs to be true value eroding mitigants.

The last four constructs were subsequently all proved to be statistically valid and therefore the hypotheses (H5 to H8) were accepted.

5.7 Conclusion and Model (Quantitative)

5.7.1 Conclusion

From the foregoing analysis it is evident that the conceptual Theoretical Technology Value Framework provides a comparatively accurate representation for the situation in which IS are utilised by end-users to likewise create and destroy organisational/ business value. As noted previously, the two constructs represented by respectively Behavioural Beliefs and Behavioural Attitudes were perceived by respondents to be a single construct designated as Behavioural Beliefs & Attitudes (BBA). However, except for the foregoing construct unification, the remaining constructs comprising the framework were all shown to be independent as well as statistically valid and reliable.

When evidencing the complexity inherent in the models depicted in Figures 5.4, 5.5, 5.7 and 5.8, the need for a representative, yet, relationally simple and parsimonious model, became evident, resulting in the advancement of the quantitative Adjusted Technology Value Model delineated in Figure 5.11. Comparing Figure 2.13 (Theoretical Technology Value Framework) to Figure 5.11, it is moreover evident that respondents were not in agreement as to the unidirectional flow of Behavioural Beliefs towards both Behavioural Attitudes and Behavioural Intention, and the flow in turn, from Behavioural Attitudes towards Behavioural Intention, and lastly the flow from Behavioural Intention as the solitary conduit towards end-user action. Rather, the data supported bidirectional causation flows between the Behavioural BAI Constructs, Value Eroding Behaviour Constructs and the Value Eroding Mitigation Constructs. One possible explanation for the bidirectional flows may be respondents' understanding of Beliefs; i.e. that it may likewise be defined as qualities innate to an individual that informs his moral or ethical opinions or convictions, independent of the activity of interacting with an IS, as discussed in Section 4.1.4. However, the testing of this phenomenon is beyond the scope of this research.

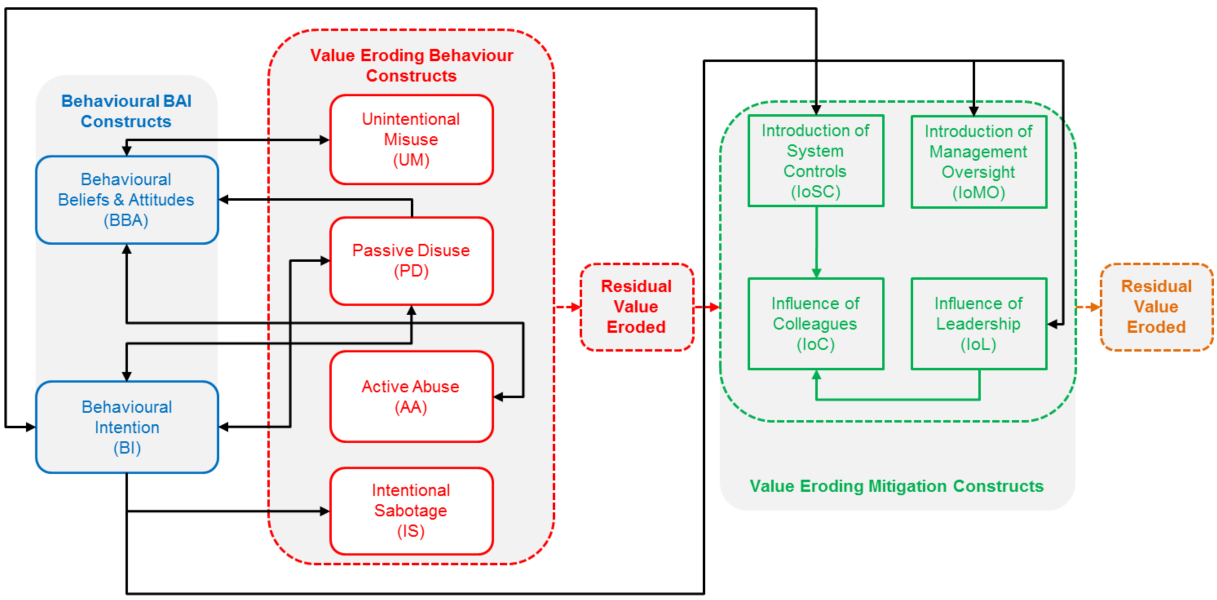


FIGURE 5.11 ADJUSTED TECHNOLOGY VALUE MODEL – QUANTITATIVE (AUTHOR)

The view that emerged as being the best aligned with the results from the data analysis, evidenced Behavioural Intention, rather than Behavioural Beliefs & Attitudes to be significantly correlated with both the Value Eroding Behaviour and Value Eroding Mitigation constructs. The seemingly non-relatedness of the Active Abuse construct to any of the composing constructs within both the Behavioural BAI and Value Eroding Mitigation constructs seems unusual.

Moving on to the relationships between the four Value Eroding Behaviour constructs, the data showed significant bidirectional relationships between each of the four constructs and the other three. Likewise, this proved true for the four Value Eroding Mitigation constructs and the Behavioural constructs i.e. BBA and BI.

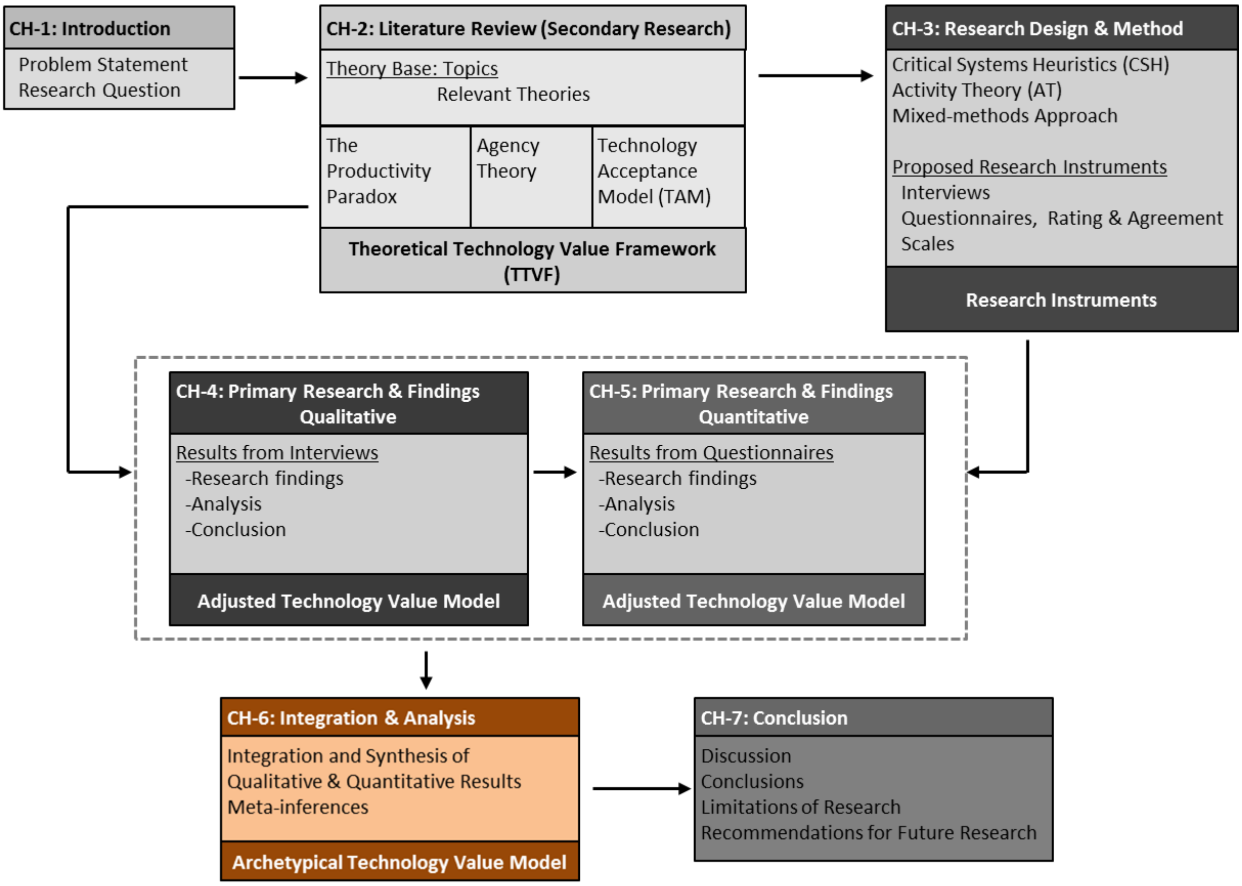
Finally, the overall inference drawn from the data analysis of the Value Eroding Mitigation constructs supports the view that while all four constructs were perceived to be valid, not every construct proved to act as a mitigant for each one of the four Value Eroding Behaviour constructs. The three constructs related to the Influence of Leadership, the Introduction of Systems Controls, and the Influence of Colleagues were seen to be more effective in mitigating value eroding behaviour related to Passive Disuse and Intentional Sabotage, while the construct related to the Introduction of Management Oversight was only effective in the mitigation of Passive Disuse.

The quantitative data analysis process did not show any of the Value Eroding Mitigation constructs to mitigate directly against Unintentional Misuse or Active Abuse.

5.7.2 Adjusted Technology Value Model (Quantitative)

From the foregoing analysis, i.e. the validity of each of the constructs and the commensurate relationships that exist between each the constructs, the Theoretical Technology Value Framework was updated to reflect the results from the EFA and CFA results towards the Adjusted Technology Value Model, depicted in Figure 5.11.

CHAPTER 6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CH-5: Primary Research & Findings Quantitative
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-Research findings
-Analysis
-Conclusion
Adjusted Technology Value Model
CH-6: Integration & Analysis
Integration and Synthesis of Qualitative & Quantitative Results
Meta-inferences
Archetypical Technology Value Model
CH-7: Conclusion
Discussion
Conclusions
Limitations of Research
Recommendations for Future Research

6. INTEGRATION AND ANALYSIS OF QUALITATIVE AND QUANTITATIVE RESULTS

6.1 DATA TRIANGULATION

Triangulation of methods enables a researcher to address a broader range of historical, attitudinal and behavioural issues, and so develop converging lines of inquiry that may be applied to ensure findings and conclusions grow evermore convincing and accurate (Ihantola & Kihn, 2011). Triangulation in its various forms has also been considered useful in improving the reliability of a study (Lillis, 2006).

Ihantola & Kihn (2011) propose data triangulation as a verification technique applied in mixed methods research to facilitate the validation of results from qualitative and quantitative sets of data on a particular subject under study, the goal, Lewis, Grimes, Lewis, & Grimes (1999) note, is a more rich, holistic, and contextualized purview. Moreover, the latter authors argue that it allows the researcher to converge interpretivist and positivist sets of results by synthesising possible contradictions in the data. Finally, they stress that augmented confidence is gained for cases where data sets indicate strong agreement.

The process of data triangulation does not in essence position the claims of one data set (e.g. qualitative) against another (e.g. quantitative), but rather attempts to mix two sets of, potentially contradictory, data into a richer and thicker blend of understanding. Howe (2012) suggests that the process of data triangulation need not aim to either confirm or disconfirm a given claim, depending on whether data from different methods either converge or diverge. Rather, he argues, the researcher should seek to accommodate apparently conflicting data by bringing it under a more comprehensive explanatory framework.

Re-specification decisions should be based on the unification of both theory and content considerations and not on statistical considerations alone (Anderson & Gerbing, 1988). In line with the foregoing, the author did not purely strive to synthesise conflicting data but also allowed for divergent views to remain intact. However, this does not mean that all data were considered to hold equal weight. Data on complex concepts, e.g. the potential interrelationships between the four value eroding behaviour constructs proposed within the Theoretical Technology Value Framework, were much more conclusive and evident from the qualitative process than the quantitative process. Hazzan, Dubinsky, Eidelman, Sakhnini, & Teif (2006) support this view by suggesting that while a chosen research approach (quantitative or qualitative) cannot be claimed to be universally preferable over the other, some phenomena are more suitable for investigation using a particular research approach.

6.2 META-INFERENCES

The need to clarify the intent for inclusion of multiple methods of data collection and multiple forms of analysis, and the complexity of designing multi-method studies, calls for more explicit procedures focused on understanding the research problem and the philosophical foundation for the choice of methodology (Thota, Berglund, & Clear, 2012). Hence, meta-inferences drawn from the mixed methods research were subjected to a legitimation framework (Refer to Table 6.1) which addresses the specific threats to quality that come to the fore when inferences from the qualitative and quantitative components of the study are combined to form meta-inferences (Ihantola & Kihn, 2011; Onwuegbuzie & Johnson, 2006).

In line with the guidance from Appendix B (Venkatesh *et al*., 2013), the author drew a number of meta-inferences from the mixed methods research data. Meta-inferences were derived from the primary research in line with the research objective and theoretical contributions. Since Bryman (2007) argues that the advancement of mixed methods research is hindered by the tendency of researchers to not properly integrate conclusions from qualitative and quantitative findings, Sections 4.2 and 5.4 were accordingly synthesised.

Onwuegbuzie & Johnson (2006) emphasise that legitimation (validity) is not an outcome, but a continuous, iterative and interactive process that should occur at each stage of the mixed research process. Moreover, they stress the need for researchers to address several types of legitimation that come to the fore as a result of combining inferences from the quantitative and qualitative components of a mixed research study to form meta-inferences. Table 6.1 provides a summary of threats articulated by (Ihantola & Kihn, 2011) for each of the legitimation types proposed by (Onwuegbuzie & Johnson, 2006).

TABLE 6.1 EXAMPLES OF THREATS TO THE QUALITY OF MIXED METHODS RESEARCH (Ihantola & Kihn, 2011; Onwuegbuzie & Johnson, 2006)

Legitimation Type	Examples of Threats
1. Sample Integration	
The extent to which the relationship between the quantitative and qualitative sampling designs yields quality meta-inferences.	Mismatch between quantitative and qualitative samples.
2. Inside-Outside	
The extent to which the researcher faithfully presents and appropriately utilizes the insider's view and the observer's views for purposes such as description and explanation.	The imbalance between insider's and outsider's views (e.g. the researcher has failed to maintain a well informed and balanced perspective when collecting, analysing, and interpreting what the whole set of qualitative and quantitative data mean).
3. Weakness Minimization	
The extent to which the weakness from one approach is compensated by the strengths from the other approach.	Careless assessing of threats to and weaknesses from quantitative and qualitative parts of research. Deficiencies in compensating the weaknesses by the strengths.
4. Sequential	
The extent to which one has minimized the potential problem wherein the meta-inferences could be affected by reversing the sequence of the quantitative and qualitative phases.	The sequencing itself would be a threat if the results and interpretations would be different if the order of the quantitative and qualitative phases was reversed.
5. Conversion	
The extent to which the quantitizing or qualitizing yields quality meta-inferences.	"Counting pitfalls associated to verbal counting, misleading, a contextual and over-counting. Over-generalizations and representations of people that is unrealistic."
6. Paradigmatic Mixing	
The extent to which the researcher's epistemological, ontological, axiological, methodological and rhetorical beliefs that underlie the quantitative and qualitative approaches are successfully (a) combined or (b) blended into a usable package.	Competing dualisms of paradigmatic assumptions: the researcher does not make her/his paradigmatic assumptions explicit and does not conduct the research according to the stated assumptions.
7. Commensurability	
The extent to which the meta-inferences made reflect a mixed worldview based on the cognitive process of Gestalt switching and integration.	Lack of cognitive and empathy training of researchers and their inability to make Gestalt switches.
8. Multiple Validities	
The extent to which addressing legitimation of the quantitative and qualitative components of	Threats to the quality of quantitative and qualitative parts of the study.

the study result from the use of quantitative, qualitative, and mixed validity types, yielding high quality meta-inferences.	
9. Political	
The extent to which the consumers of mixed methods research value the meta-inferences stemming from both the quantitative and qualitative components of a study.	"Value or ideologically based conflicts when different quantitative and qualitative researchers collaborate in a mixed methods study.

The evaluation of meta-inferences for this study was aligned to the perspectives of the research objective and theoretical contributions to ensure suitable reporting of results. Moreover, the legitimation types in Table 6.1 were adopted as parameters within which the discussion on the following meta-inferences was based.

1. <u>Sample Integration</u>: Since sample integration legitimisation is concerned with the extent to which the relationship between the quantitative and qualitative sampling designs yields quality meta-inferences, the same individuals (or groups) must be involved in both the qualitative and quantitative parts of a study. From Sections 3.8 and 3.9 it is evident that the two sample groups were extracted from a single population. Since the quantitative section of the research safeguarded the anonymity of individual responses, it is not possible to establish which of the participants actually also completed the questionnaires. The meta-inferences are however accepted to be strong because of the representative samples from the two phases which, in turn, support statistical generalizability (population transferability). Moreover, the situation is enriched by the relatively large size and randomness of the quantitative sample.

2. <u>Inside-Outside</u>: Inside-outside legitimation describes the extent to which the researcher accurately presents and appropriately utilizes the insiders' views (qualitative) and the observers' views (quantitative) for purposes such as description and explanation. While a certain measure of tension does exist between the results from Sections 4.2 and 5.4, this is acceptable since qualitative research pursued interpretations from insiders, while quantitative research tracked objective outsider views. The author ensured that a well informed and balanced perspective was maintained during the collection, analysis, and interpretation of the sets of both qualitative and quantitative data. Although these two viewpoints are not fully in balance, this is not perceived to be a material threat since the

complexity of the Theoretical Technology Value Framework could not be clarified in a bidirectional conversation flow for the quantitative part of the research as was possible during face-to-face interviews. Subject to the foregoing, the author was very mindful of the existing imbalance, hence more weight was placed on the feedback received from the face-to-face interviews compared to the questionnaires.

3. <u>Weakness Minimization</u>: This legitimation type refers to the extent to which the weakness from one approach is compensated by the strengths from the other approach. In order to compensate against weakness minimization legitimation the author carefully identified the threats to the quality of the qualitative and quantitative parts of mixed methods research. While the qualitative research component provided for a wealth of data on the relationships amongst the 10 constructs, proposed within the Theoretical Technology Value Framework, the quantitative results confirmed the validity of the actual constructs. This provided richness to the understanding of the structure and workings within the Theoretical Technology Value Framework, hence ensuring that the possible threats and weaknesses from one approach were compensated by the strengths from the other approach.

4. <u>Sequential</u>: Sequential legitimation denotes the extent to which the author has minimized the potential problem wherein the meta-inferences may be affected by reversing the sequence of the qualitative and quantitative phases. Although a sequential mixed research design was applied, i.e. qualitative followed by quantitative, each phase was executed relatively independently from the other to safeguard against the meta-inferences being affected by the sequencing as such. There is no expectation that the results or interpretations would have been materially different if the order of the qualitative and quantitative phases had been reversed.

5. <u>Conversion</u>: Typology conversion legitimation refers to the extent to which the quantitizing or qualitizing yields quality meta-inferences (Onwuegbuzie & Johnson, 2006). Since counting is a common way of quantifying qualitative data, numbers were recorded in Table 4.2 to complement and enhance narratives; however care was taken

to ensure numbers were not used in ways that produced untrustworthy findings. Sandelowski (2001) provides guidance on four counting pitfalls associated with among other things verbal counting, misleading counting, acontextual and overcounting. While v**erbal counting** does occur in the study i.e. the author implying numbers with expressions, the author repeatedly strove to substantiate these expressions with actual quotations from participants. M**isleading counting** was avoided by not using only percentages to describe small samples, but to provide all percentages within the context of the total number of participants. **Acontextual counting** where unsubstantiated inferences are drawn from the numbers was avoided by not making inferences that could not correspondingly be substantiated by the theory. The final pitfall namely **overcounting,** i.e. when numbers are used just for the sake of counting was countered by ensuring that the development and presentation of interpretations were singularly focused on the target phenomenon.

During quantitative research there exists a caveat to qualitize quantitative data via narrative **profile formation** (Onwuegbuzie & Johnson, 2006). In order to eliminate the basic threats to profile formation, care was taken not to digress into over-generalizations of the observed numerical data and such representations of people (e.g., average profiles) that may prove to be unrealistic.

6. <u>Paradigmatic Mixing</u>: The sixth legitimisation type raises the concern around the researcher's epistemological, ontological, axiological, methodological and rhetorical beliefs that underlie the quantitative and qualitative approaches which must be successfully combined or blended into a usable package (Onwuegbuzie & Johnson, 2006). Combining the approaches can be problematic because of competing dualisms of paradigmatic assumptions: epistemological (objectivist vs. subjectivist), ontological (single reality vs. multiple realities), axiological (value free vs. value bound), methodological (deductive logic vs. inductive logic), and rhetorical (formal vs. informal writing style) assumptions. Two ways of legitimation are proposed by Onwuegbuzie & Johnson (2006), namely quantitative and qualitative approaches are treated either as (a)separate but complementary or as a (b)continuum and compatible. Section 3.5

provides a description of how, among other things, the threat posed to the legitimization of the mixed research effort by paradigmatic mixing, was mitigated by the author in making explicit his paradigmatic assumptions and then conducting the research according to the stated assumptions.

7. <u>Commensurability</u>: The commensurability type of legitimation is based on the requirement that the mixed methods researcher must learn to make Gestalt switches from a qualitative lens to a quantitative lens, going back and forth. Through this iterative process, a third well-informed viewpoint based on consideration of both qualitative and quantitative viewpoints should be created (Ihantola & Kihn, 2011; Onwuegbuzie & Johnson, 2006).

8. <u>Multiple Validities</u>: Multiple validities legitimation is concerned with the extent to which addressing legitimation of the qualitative and quantitative components of the study result from the use of quantitative, qualitative, and mixed validity types, yielding high quality meta-inferences (Onwuegbuzie & Johnson, 2006). The aforementioned authors furthermore emphasise that when addressing legitimation of the qualitative (or quantitative) component, the relevant qualitative (or quantitative) validity criteria need to be addressed and achieved and during integration of these components the relevant mixed legitimation types need to be addressed and achieved. In view of the foregoing, the author paid particular attention to the contextual validity, generalizability and transferability of the qualitative part of the study, and similarly to the internal and external validity of the quantitative part of the study, and then used the mixed method validity criteria to combine these parts.

9. <u>Political</u>: The final legitimation type examines the extent to which the consumers of mixed methods research value the meta-inferences stemming from both the quantitative and qualitative components of a study (Onwuegbuzie & Johnson, 2006). The initial challenge of politics is immaterial to this study since it refers to the tensions emerging as a result of combining qualitative and quantitative approaches including, any value or ideologically based conflicts when different quantitative and qualitative

researchers collaborate in a mixed methods study. However, it is accepted that the contradictions and paradoxes that emerge when qualitative and quantitative data are compared and contrasted, may prove to be difficult to explicate to external consumers of mixed methods research to ensure they place value on the meta-inferences stemming from both the qualitative and quantitative findings (Onwuegbuzie & Leech, 2009).

Consideration and the application of the forgoing triangulation requirements has enabled the author to address and synthesise a range of attitudinal and behavioural objects, thereby enhancing the development of converging lines of inquiry that could be applied in the next chapter, so as to establish conclusions that are reliable, convincing and accurate (Ihantola & Kihn, 2011).

6.3 PRACTICAL VALIDATION OF ARCHETYPICAL TECHNOLOGY VALUE MODEL

Due to the impracticability of implementing the Archetypical Technology Value Model within the research timeframe, it could not be empirically validated in practice; hence a focus group of nine individuals was invited to a presentation on the model, by the author. The selection process followed a sample of convenience approach, i.e. participants were invited from the Information Technology risk team since the respective members have a working understanding of amongst others: enterprise data services, application development & maintenance, infrastructure & operations, security and shared services, programme management design & architecture, compliance, human resources, marketing & communications. Eight of the attendees completed the short questionnaire on the real-world value that the model could provide within a technology driven organisation.

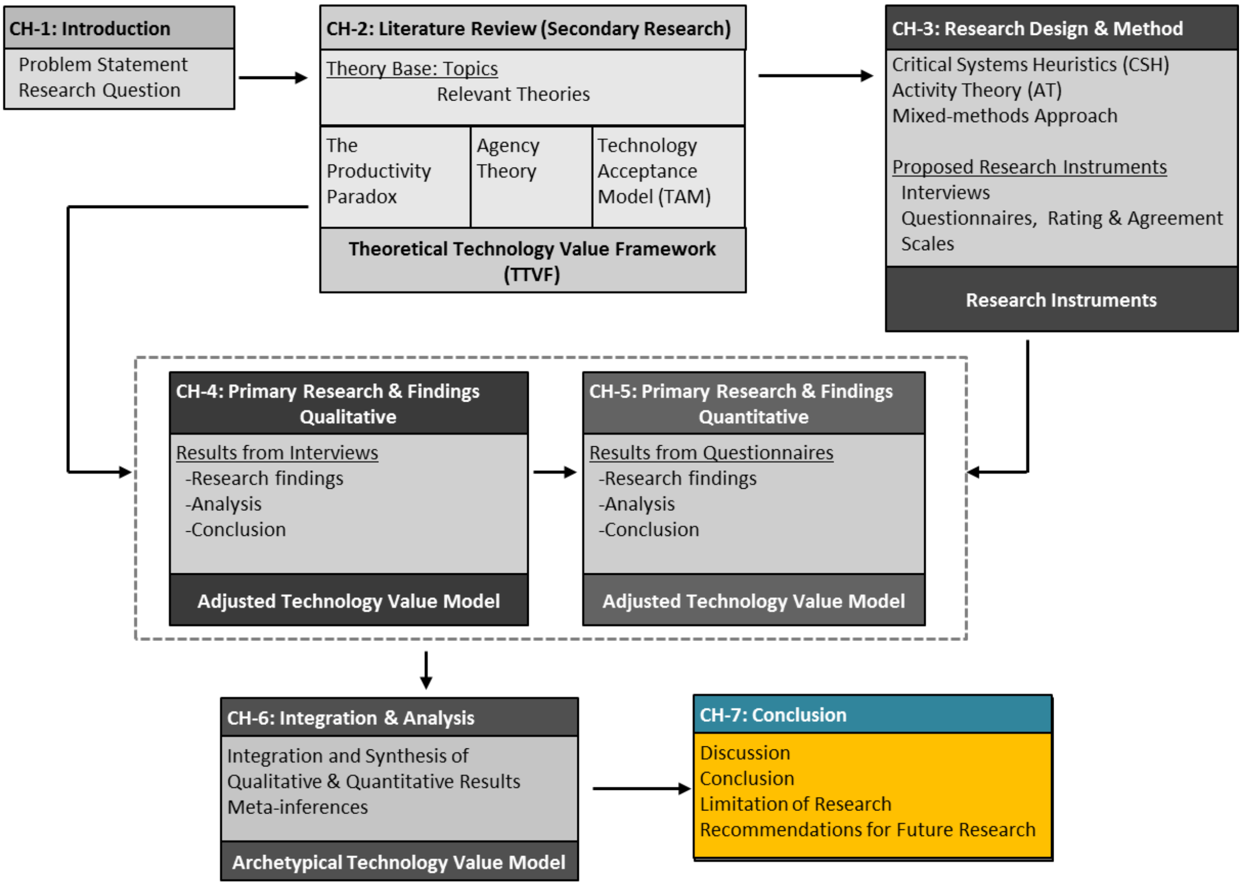
All eight respondents agreed that the Archetypical Technology Value Model serves as an explanatory decedent to the Technology Acceptance Model. They moreover stated that the Value Eroding Behaviour Constructs explain between 80 percent and 100 percent of value eroding behaviour by employees interacting with computer systems.

When asked to provide examples of construct gaps, none of the respondents identified any new value eroding constructs. However, one participant (Participant-02) noted on Question 4 that: "*… as technology and how we interact with it changes, human behaviour may change and so may values*." While the author agrees with the statement, the Archetypical Technology Value Model is positioned as a dynamic model that provides for continuous change within constructs over time. The model is anticipated to self-correct through the established feedback loops. A second participant whose response, on the same question, is worth mentioning, is Participant-03, who stated that: "*The only additional mitigating option is the one which was already mentioned, change management and staff awareness/ training.*" Once again the author agrees with these assertions, subject to the qualification that both change management and staff awareness & training should be augmented by incorporating metrics that evidence the required level of change adoption, and a correct understanding and subsequent application of knowledge, once awareness or training sessions have concluded.

Participants were furthermore requested to provide an opinion on the extent to which they believed the Value Eroding Mitigation Constructs explain mitigating options available to organisations to minimise value eroding behaviour of employees interacting with computer systems, and if they believed that there were any construct gaps. Once again the respondents agreed that the mitigating constructs were comprehensive and did not provide any suggestions for additional constructs. Suggestions provided of items could easily be categorised under one or more of the existing constructs.

Lastly, participants were requested to provide practical examples on how the Archetypical Technology Value Model may be applied in the workplace to both identify value eroding behaviour and mitigate it. The detailed feedback from the eight respondents on the Archetypical Technology Value Model is provided in Appendix Q.

CHAPTER 7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7. SUMMARY OF CONTRIBUTION

7.1 INTRODUCTION

The final chapter of this thesis provides the reader with a brief overview of the findings from the research project. The thesis states the objective for the study, formulates a concomitant problem statement supported by research questions and the proposed research outcome. A theoretical foundation is provided in support of the foregoing, followed by the research design and methods used to conduct the primary research. The results from the data is then analysed and presented in the form of an Archetypical Technology Value Model. This chapter concludes the thesis by reflecting on what was found during the study, what was learned and closing recommendations from the author.

7.2 SUMMARY

The project moved from the motivation in **Chapter 1** to explore why considerable business value is eroded as a by-product of Human Computer Interactions (Silver *et al*., 1995). The author suggested that business value dissipation by users of IS may be meaningfully reduced if an archetypical model could be developed and applied to both identify and mitigate value erosion. The chapter then proceeded to define the primary research question regarding how the adoption and use of an IS in an organisation, as an explicit value creator, can be moderated to prevent it from inadvertently bringing about the concomitant destruction of business value (Bhattacherjee, 2001; Dawson *et al*., 2010; Linder & Foss, 2013)? In answer to the research question the chapter proposed, as a primary research outcome, the realisation of an Archetypical Technology Value Model that can be applied within Information Technology driven organisations as a value-dissipation-lens to detect, mitigate, minimise or eliminate the unintentional value destroying effects of IS on organisations

In **Chapter 2** the literature was employed to both understand business value erosion within the context of Human Computer Interaction (Schryen, 2013; Soh & Markus, 1995), and to detect a breach within the extant theory that mandated the development of a theoretical framework, expressive of IS end-user behavioural activities causing business value erosion, to fill the gap. Chapter 2, moreover, served to address the **first three** of seven secondary **research objectives** of the study as stated in Section 1.2.3.

While the ever increasing costs of supporting and maintaining and IS tend to be well defined through the principle of amongst others *technical debt*, the business value eroded as a direct result of the misapplication of a system, by end-users, called for further investigation. The purpose of this thesis was to investigate in what way the adoption and use of an IS in an organisation, as an explicit value creator, also inadvertently brought about the destruction of business value. Particular focus was placed on the interaction between human agents and IS and the resulting activities that tended to destroy business value to various degrees.

The management question of whether IT spent in reality delivers on the anticipated economic benefits has not only been left partly unexplained by the extant literature, but also hard to demonstrate and conclusively answer, hence the productivity paradox (Brynjolfsson, 1993). Since an IS may be perceived by an employee to be both an extension of the employing organisation and an extension of himself, the IS may be seen as equally an ally and foe. Hence, it was necessary to firstly explore the field of humanities in order to gain an understanding on how human agents relate to work tasks.

It was shown that the creation of organisational value is directly informed by employee and management productivity, which in turn is strongly informed by constructive individual and group behaviour; Subsequently, a dissonant held set of ideas, beliefs and values within a work community or group, may very well cause some individuals to dissipate value from within the organisation. Once a new technological solution is introduced into the environment, it may simply become a convenient tool that is misemployed by an employee in order to execute on his intentions, leading to potential business value erosion.

The Lazy User Theory (Collan, 2007) provided support to the foregoing by suggesting that an end-user will be inclined to utilise solutions that are supposed to be most suitable and usable to execute a particular task, and he will moreover show preference to solutions based on the lowest level of effort required by him to complete his work. An IS that is mandated for use in the execution of a particular task and the required processes to be followed, are not necessarily factored into the employee's behaviour. The Technology-to-Performance Chain (Goodhue & Thompson, 1995) takes this idea one step further by proposing that for technology to have a positive impact on a user's performance, user utilisation is not only required but alignment between the characteristics of the task that the user has to perform, and the technology, needs to exist. If a user considers a specific system to be more closely aligned to a particular task than another, he is prejudiced towards the use of the former, even though the latter may be the system mandated for use by the organisation, and in fact better suited for executing the particular work task.

Building onto the preceding two theories, the Agency Theory (Eisenhardt & Eisenhardt, 1989) describes the challenges that the employer (the principal party), faces when endeavouring to motivate a self-interested employee (the agent), to act in the best interests of the principal rather than in his own interests.

The foregoing theories were constructed into a Theoretical Value Eroding Framework that extended out rightwards from TAM, akin to the Wixom & Todd Research Model which extended out leftwards from TAM, to produce an Archetypical Technology Value Model (Figure 7.1). The validity of the model was empirically confirmed by both qualitative and quantitative research data.

Chapter 2 provided answers to the first two of four secondary research questions. The **first research question** was addressed in the literature review by considering a number of theories and models that together provided an explanatory context within which the question of the introduction of an IS, for the purposes of creating new or sustaining existing business value subsequently also inadvertently dissipate value, could be understood. The **second research question** was similarly answered through the development of a Theoretical Technology Value Framework from the literature that in the main delineates the overall unintentional value destroying causes and effects of IS on organisations.

Chapter 3 positioned the approach that the author followed to conduct the primary research. Chapter 3, subsequently aided in achieving the **fourth research objective** of the study as stated in Section 1.2.3.

Both qualitative and quantitative empirical studies were conducted to validate the constructs per se, as well as the relationships prevalent amongst the various components comprising the theoretical framework. Creswell *et al*. (2003) clearly demonstrated the advantages of mixing qualitative and quantitative data collected in a single study. The mixed methods research approach necessitated the conducting of both semi-structured interviews (qualitative) and the distribution of questionnaires (quantitative) to a sample group of IS end-users. Both Critical Systems Heuristics and Activity Theory were employed to formulate the interview questions and analyse data from participant responses. Critical Systems Heuristics is proposed by Mingers & White (2009) as a particular problem solving technique congruent with Activity Theory, as both approaches allocate particular focus to the influences of human intentionality (Lewis, 2004, 2007).

In **Chapter 4** and **Chapter 5**, respectively, data from interviews (qualitative) and questionnaires (quantitative) were analysed. Two distinct Adjusted Technology Value Models were developed from the results; the first expressive of the findings from the qualitative analyses (Figure 4.8) and the second delineating the findings from the quantitative analyses (Figure 5.11). Chapters 4 & 5, directly address the **fifth research objective** of the study as stated in Section 1.2.3.

Chapter 6 provided for meta-inferences, which is described by Venkatesh *et al*. (2013) to be the integration of the findings from qualitative and quantitative studies. Chapter 6, furthermore, served to address the **sixth research objective** of the study as stated in Section 1.2.3.

The results from the primary research revealed that negative end-user behaviour can be explained in terms of four value eroding dimensions namely: (1) Unintentional Misuse, (2) Passive Disuse, (3) Active Abuse, and (4) Intentional Sabotage. The results emanating from the analyses confirmed the preliminary findings springing from the literature review on the subject of the misapplication of IS by end-users. Conversely, four factors were identified that will, to a greater or lesser degree, mitigate the four value eroding dimensions namely: (1) Influence of Leadership, (2) Introduction of System Controls, (3) Introduction of Management Oversight, and (4) Influence of Colleagues. The value eroding mitigation qualities of the aforementioned factors were similarly empirically validated.

From the foregoing analyses, i.e. the validity of each of the constructs and the identification of the commensurate relationships that exist between each the constructs, the Theoretical Technology Value Framework was restructured to reflect the results from both the qualitative and quantitative analyses towards an Archetypical Technology Value Model, delineated in Figure 7.1.

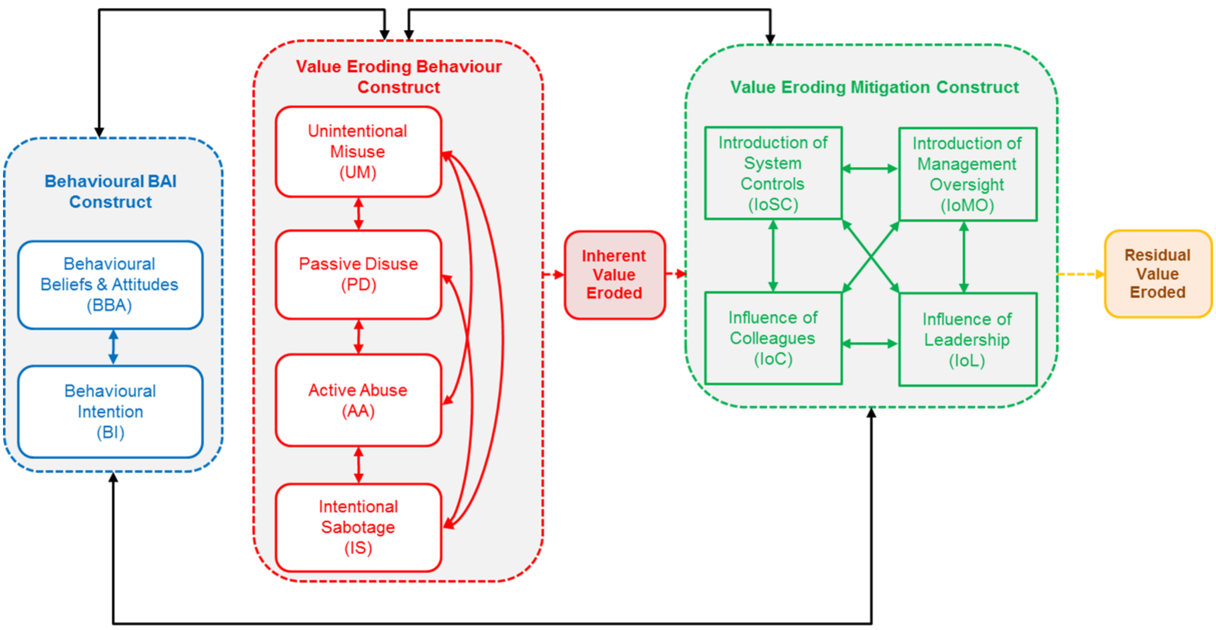

FIGURE 7.1 ARCHETYPICAL TECHNOLOGY VALUE MODEL (AUTHOR)

Business value conservation and recommendations for the development of organisational change management practice and policy making may be derived from the model. The model may moreover be applied to enhance the successful implementation of any new IS within an organisation, thereby ensuring that the business case for the adoption and use of the IS, by employees, to create organisational value, includes an approach to both identify the potentiality for the manifestation of the four value eroding dimensions and a concomitant strategy on how each of the four mitigating dimensions could be employed to ensure value erosion is appropriately minimised.

Chapters 4 through 6 provided answers to the **third research question** by evidencing by what means the resultant value dissipating effects on an organisation may be contextualised and qualified or quantified into two Adjusted Technology Value Models that accurately delineate the overall unintentional value destroying causes and effects of IS on organisations. The respective qualitative and quantitative Adjusted Technology Value Models were integrated into a representative Archetypical Technology Value Model in Chapter 6.

The **seventh and final secondary research objective** of the study, as stated in Section 1.2.3, is addressed in the following sub-sections. Chapter 7, moreover, answers the **fourth and final research question** by considering the extent to which the Archetypical Technology Value Model may be positioned as a lens for Information Technology driven organisations that can be generically applied to mitigate, minimise or eliminate the unintentional value destroying effects of IS on organisations.

7.3 Conclusions Reached

To increase positive end-user behaviour towards IS usage, organisational leaders should encourage implementation strategies that evangelise the usefulness of a particular IS, render end-user work style compatibility, and establish user trust in that the leadership explicitly exhibit their personal adoption and use of the new system as intended. In the main, automated system controls should be integrated into the security architecture of the system to ensure users' access privileges and actions (both viewing and transactional) are limited to their particular roles and systematically tracked. Line management should seek to foster consistent managerial oversight, ensuring team members are using the right system (organisationally approved) in the right way (following approved business processes) to do the right (relevant and authorised) forms of work. Lastly, an organisational culture should be fostered where peer-to-peer accountability, emphasising value creation and disapproving value erosion, is weaved into the fabric of the organisational values.

Moreover, for system developers responsible for organisational IS design, it is worth noting the four potential value eroding dimensions and explicating these to the various stakeholders in the preliminary design phase of the system, or in the *request for tender* phase where an off-the-shelf system is to be procured.

Finally, the Archetypical Technology Value Model may be positioned as a lens for Information Technology driven organisations, that can be generically applied to identify, mitigate, minimise or eliminate the unintentional value destroying effects of IS on organisations.

7.4 SUMMARY OF CONTRIBUTIONS AND IMPLICATIONS FOR EXTANT THEORY

The primary research outcome, namely the realisation of the Archetypical Technology Value Model may be applied within the extant theory, discussed in this section, to explicate and enrich the understanding and application of the theories or models.

The results from the primary research and ensuing Archetypical Technology Value Model, are consistent with the updated DeLone & McLean model (DeLone & McLean, 2003; Urbach & Müller, 2012) in that both utilization and user attitudes toward technology were shown to be important. Moreover, the primary research especially supported the *Intention to Use* construct of the DeLone & McLean model as it further elucidated the behavioural intent of end-users, occasioning in IS abuse.

The research also indisputably reinforced the phenomenon of the Productivity Paradox supporting the discrepancy between extremely large IT investments and relatively low measures of productivity output (Ahmad & Arshad, 2014; Aral *et al*., 2012; Anitesh Barua *et al*., 1995; Brynjolfsson, 1993; Maes *et al*., 2011; Nevo & Wade, 2010). It furthermore confirmed the problem of increased organisational spent on IT with little realisation or insufficient justification on how, why and when IS investments create business value (Schryen, 2013; Soh & Markus, 1995). In a similar vein the research supported the literature by explicating the continued challenge that exists within organisations to measure and communicate IT value, noting that while many IT metrics measure performance, they do not measure actual value (Mitra *et al*., 2011).

The investigation also confirmed the contributions made by a number of authors maintaining that the primary challenges experienced by technology driven organisations laid not with the technology per se, but with the human element utilising it (Anderson *et al*., 2003; Donovan *et al*., 1997; Haspeslagh *et al*., 2001). In agreement with the research the listed authors moreover note that value creation within an organisation will only attain importance once every employee understands his or her role within the context of the organisation, and how it contributes towards value creation. This corresponds to the accounts from Val-IT development team who, in line with the primary research, correctly identifies change management as the key ingredient to the successful implementation or improvement of value management (Val-IT, 2008).

The research data furthermore maintained the notion that users have an articulated need for which a selection of satisfactory solutions, products or services exists, and that they will be biased towards those solutions that are perceived as most suitable and usable at a specific place and point in time as demonstrated through the Lazy User Theory (Benitez-Amado *et al*., 2014; Collan & Tétard, 2011). Joining into the Lazy User Theory, the Technology-to-Performance Chain model (Davis, 2010; Goodhue *et al*., 1995; Melville *et al*., 2004; Tétard & Collan, 2009) Goodhue & Thompson (1995), asserts that in order for technology to have a positive impact on a user's performance, IS user utilisation is required and alignment between the characteristics of the task that the user has to perform, and the technology needs to exist. The data from the research provide an explanation for the impact that technology has on a user's performance and furthermore may be applied as a predictor of an improvement in job performance and task effectiveness.

The research also attested the presence of both relics of Agency Theory (Gurbaxani & Whang, 1991; Linder & Foss, 2013; Neumann, 2013) and Stewardship Theory (Davis, Schoorman, & Donaldson, 1997; Fox & Hamilton, 1994) within the research organisation. Where the former theory defines the agency dilemma and describes the challenges that the employer faces when endeavouring to motivate a self-interested employee to act in the best interests of the employer rather than in his own interests, the latter theory suggests that employees will act in the best interest of the organisation purely out of volition. The impacts of both these theories were clearly evident from the research findings.

Finally, the results from the research supported the antecedent theories and models contributing towards the Archetypical Technology Value Model. These included theories and models comprising the Theory of Reasoned Action model from Fishbein & Ajzen (1975, 1980) predicting generic human behaviour as a construct of behavioural intention, the Theory of Planned Behaviour from Ajzen (1991) proposed as a means to improve on the predictive power of the Theory of Reasoned Action by including the construct of *Perceived Behavioural Control*, and lastly TAM from Davis (1989) intending to explain and predict user behaviour within the context of user acceptance of IS.

In step with the forgoing theories and models, the Archetypical Technology Value Model serves as the salient theoretical contribution made by the author. Both the Value Eroding Behaviour and Value Eroding Mitigation constructs, comprising the model, as well as the overall position that the model assumes as a logical extension to TAM (Figure 7.2), are submitted as novel contributions to the existing literature.

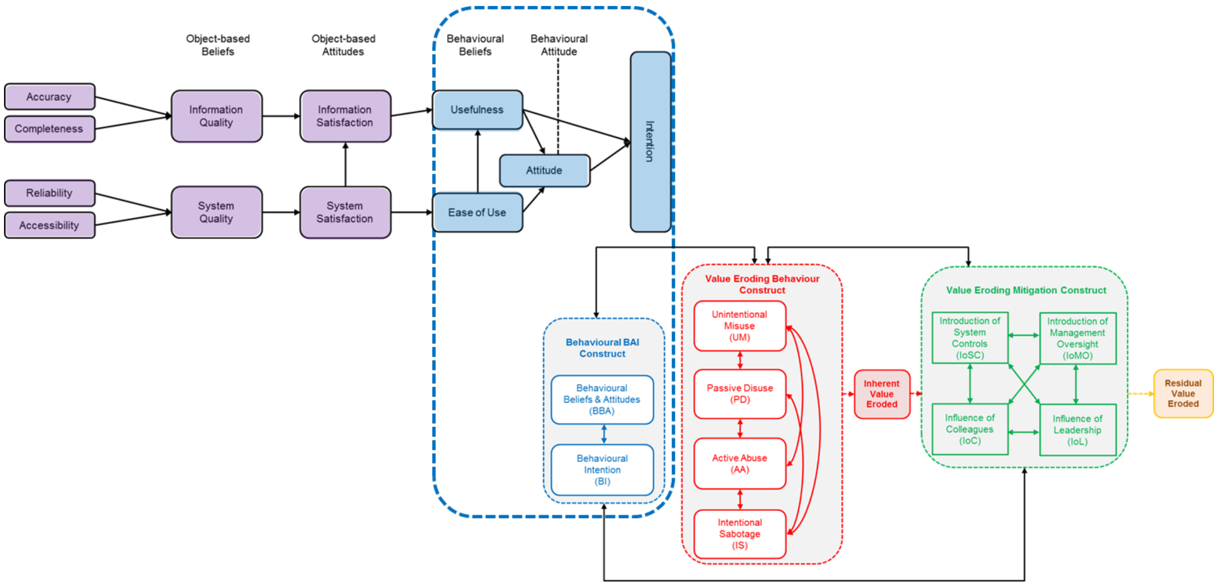

FIGURE 7.2 ASSEMBLY OF ARCHETYPICAL TECHNOLOGY VALUE MODEL IN RELATION TO TAM AND THE WIXOM & TODD RESEARCH MODEL (AUTHOR)

In addition to the development of an Archetypical Technology Value Model, the author has also made a methodological contribution through the federation of Critical Systems Heuristics with Activity Theory as a means to enrich the qualitative research approach.

Lastly, in the multimethod approach that was pursued, mixed methods research was applied as a means to augment the primary research practice. By contrasting and combining the results from respectively the qualitative and quantitative approaches, the author’s understanding of how an imbalance within the reciprocal relationship between an end-user and an IS inadvertently destroys organisational value, was enriched.

7.5 Reflection on Locus of Research Findings within Extant Research

This section positions the contributions and implications to the scientific body of knowledge that this study has made within extant research. The scientific contribution of this study is graphically delineated in Figure 7.2. The development of the Archetypical Technology Value Model was the primary focus of this study.

The study was initiated as a direct result of the author’s interest in the divergent nature of IS usage, i.e. while it serves as a value enabler (Drnevich & Croson, 2013), IS conversely functions to serve as an enabler of business value destruction. This phenomenon is only partly explained by the productivity paradox (Brynjolfsson, 1993), which shows that the high outlay in IS does not provide measureable business value commensurate with the initial investment made (Schryen, 2013).

Since the research is concerned with HCI, literature relating to both the behaviour of the human agent and the design, implementation and operation of IS, were reviewed. While a number of theories may be positioned to explain the potential negative consequences resulting from interactions between humans and computers e.g., the Technology-to-Performance Chain by Goodhue & Thompson (1995), the Lazy User Theory by Collan (2007), the Agency Theory by Eisenhardt & Eisenhardt (1989) the Theory of Reasoned Action by Fishbein & Ajzen (1975, 1980), the Theory of Planned Behaviour from Ajzen (1991), and TAM by Davis (1989), none of these theories provide a clear and parsimonious model that exclusively describes how a self-interested employee, i.e. the agent, utilises technology to act in self-interest rather than in the interest of an employer, i.e. the principal (Gurbaxani & Whang, 1991). The Archetypical Technology Value Model, ensuing from this study, has amply explained this value eroding activity.

As previously noted, a number of studies (Benitez-Amado *et al*., 2014; Collan & Tétard, 2011; Davis, 2010; Davis, 1989; Fishbein & Ajzen, 1980; Melville *et al*., 2004; Urbach & Müller, 2012), have placed specific focus on the interactive relationships between humans and computers and endeavoured to explain how the relationships contribute positively towards organisational objectives, none of these have however attempted to illuminate the phenomenon where human agents erode organisational value through the consumption of IS. Similarly, authors investigating phenomena *vis-à-vis* the productivity paradox (Ahmad & Arshad, 2014; Aral *et al*., 2012; Anitesh Barua *et al*., 1995; Brynjolfsson, 1993; Maes *et al*., 2011; Mitra *et al*., 2011; Nevo & Wade, 2010; Schryen, 2013; Soh & Markus, 1995), have not endeavoured to identify the key value eroding constructs that comprise the HCI activity. Although the primary agent of value erosion was identified by a number of authors (Anderson *et al*., 2003; Donovan *et al*., 1997; Haspeslagh *et al*., 2001), to be the human agent, again, none of these authors attempted to articulate the actual behavioural activities or actions executed by the human agent that contributed directly to business or organisational value erosion.

From the literature review conducted as described in Chapter 2 of this thesis, and succinctly summarised in the foregoing paragraphs, it became evident that the existing literature did not offer a theory or empirical model that explained the value eroding effects that the activity of humans, interacting with computers, have on organisations. It is within this theoretical void that this thesis proposed to step in and make a contribution.

The salient difference between the existing research and this study is that this study undertook to explicate particular value eroding effects emanating from human activities. Moreover, the study endeavoured to develop a generic model that may be applied as an extension to TAM. Where the logical construct flow of TAM concludes with "*Actual System Use*" (refer to Figure 2.8), it does not endeavour to break down and articulate system use in general or system misuse in particular. In the main, this is precisely what this study achieved; it provided a window into end-user value erosion, evidencing four general value eroding constructs namely Unintentional Misuse, Passive Disuse, Active Abuse, and Intentional Sabotage.

Lastly, the outcomes of each of the actual value eroding behaviour constructs were summated into the residual value eroding determinate which represented a precursor to the mitigation gate. The latter is comprised of four constructs namely Introduction of System Controls, Introduction of Management Oversight, Influence of Colleagues, and Influence of Leadership. This study takes the HCI research a step forward in the current thinking and understanding of the negative results resulting from human interactions with computers.

7.6 DELIMITATION OF THE PRIMARY RESEARCH

The primary research was conducted within the realm of a South African financial institution greatly reliant on IS to give effect to both its operating and business models. Moreover, the organisation had embarked on a journey that would see the overhaul of its entire business and technology stack through a process of rationalising, simplifying and standardising business operations, IS (applications, data and infrastructure) and the technology infrastructure. While the research may well be generalizable to non-financial institutions, dependent on information technology, it may be less relevant to organisations where many of the core business processes are reliant on manual interventions.

The next delimiting component introduced into the research journey, was the development of the Theoretical Technology Value Framework. Comprising 10 constructs, the framework proved to be unavoidably complex, necessitating a multifaceted analysis approach. Since the framework could not be delimited within a simple parsimonious model, a mixed methods research approach was embarked on, in an effort to establish a comprehensive analysis technique, enriched by multiple analyses.

The third key delimitation relates to the general complexity permeating the quantitative segment of the research. As previously noted the questionnaire, comprising 108 questions, may have introduced an element of puzzlement amongst respondents. While the reliability of responses may have been impacted by the sheer number of questions, this is accepted to be suitably amended by the substantial number of responses (399) that were received.

7.7 RECOMMENDATIONS FOR FUTURE RESEARCH

The following recommendations are proposed to further the restricted research effort contained within this thesis whereby both the findings and Archetypical Technology Value Model may be validated and expanded on:

1. Future studies should focus on validating the Archetypical Technology Value Model against both other financial institutions within South African and abroad, and non-financial institutions delimited by industry sectors highly reliant on IT.
2. An effort should be made to deconstruct the Archetypical Technology Value Model into logical parsimonious sub models that are more easily analysed and may then be better understood. This will likewise reduce the number of questions needed for analysis of a particular sub model.
3. A component of study that was deliberately excluded, as it may have potentially expanded the thesis considerably, was the analysis of the potential moderating effects within gender, ethnicity, business units, age, level of seniority, and respondents' proficiency in IT.
4. More research should be dedicated to the constructs of Behavioural Beliefs, Behavioural Attitudes and Behavioural Intentions, specifically regarding how these relate to employees' ethical and moral behaviour rather than only behaviour directed towards beliefs concerning the usefulness and/or usability of a particular IS.
5. Finally, a comprehensive understanding of the interrelationships within the value eroding construct group as well as the mitigating construct group should be investigated, i.e. how particular constructs potentially enhance, complement or detract from each other.

7.8 CONCLUDING REMARKS

The adoption and use of an IS by human agents in an organisation as an explicit value creator, typically also inadvertently cause the destruction of business value as evidenced in the development of the Archetypical Technology Value Model. The Model, however, does not purely provide a lens whereby value destruction may be identified but also a construct within which business value destruction may be predicted, categorised and mitigated.

8. REFERENCES

Abrahamson, E., & Park, C. (1994). Concealment of Negative Organizational Outcomes: An Agency Theory Perspective. *The Academy of Management Journal*, *37*(5), 1302–1334.

Ackoff, R. (1971). Towards a system of systems concepts. *Management Science*, *17*(11), 1–10.

Agerfalk, P. J. (2013). Embracing diversity through mixed methods research. *European Journal of Information Systems*, *22*(3), 251–256. http://doi.org/10.1057/ejis.2013.6

Ahmad, F., & Arshad, N. H. (2014). Value Delivery of Information Technology Investment: A Conceptual Framework. *International Journal of Computer Theory and Engineering*, *6*(2), 150–154. http://doi.org/10.7763/IJCTE.2014.V6.854

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211.

Allen, D. K., Brown, A., Karanasios, S., & Norman, A. (2013). How should technology - mediated organizational change be explained? A comparison of the contributions of critical realism and activity theory. *MIS*, *37*(3), 835–854.

Allen, D., Karanasios, S., & Slavova, M. (2011). Working With Activity Theory: Context, Technology, and Information Behavior. *Journal of the American Society for Information Science and Technology*, *62*(4), 776–788.

Anderson, J. C., & Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, *103*(3), 411–423.

Anderson, M. C., Banker, R. D., & Ravindran, S. (2003). The new productivity paradox. *Communications of the ACM*, *46*(3), 91–94.

Ang, S., Koh, C., Ang, S., & Straub, D. W. (2004). IT Outsourcing Success: A Psychological Contract Perspective. *Information Systems Research*, *15*(4), 356–373.

Ang, S., & Slaughter, S. A. (2001). Work Outcomes and Job Design for Contract versus Permanent Information Systems Professionals on Software Development Teams. *MIS Quarterly*, *25*(3), 321.

Aral, S., Brynjolfsson, E., & Van Alstyne, M. (2012). Information, Technology, and Information Worker Productivity. *Information Systems Research*, *23*(3-NaN-2), 849–867.

Argyris, C. (1973a). Organization Man: Rational and Self-Actualizing. *Public Administration Review*, *33*(4), 354–357.

Argyris, C. (1973b). Some Limits of Rational Man Organizational Theory. *Public Administration Review*, *33*(3), 253–267.

Bagozzi, R. P. (1984). A Prospectus for Theory Construction in Marketing. *Journal of Marketing*, *48*(1), 11–29.

Bagozzi, R. P. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift . *Journal of the Association for Information Systems*, *8*(4), 244–254.

Bala, H., & Venkatesh, V. (2013). Changes in Employees' Job Characteristics during an Enterprise System Implementation: a Latent growth Modeling Perspective. *MIS Quarterly*, *37*(4), 1113–1140.

Bammer, G. (2003). Embedding Critical Systems Thinking in the Academy.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. London: Prentice-Hall.

Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological: Research Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182.

Barua, A., Konana, P., Whinston, A., & Yin, F. (2004). An empirical investigation of net-enabled business value. *MIS Quarterly*, *28*(4), 585–620.

Barua, A., Kriebel, C. H., & Mukhopadhyay, T. (1995). Information Technologies and Business Value: An Analytic and Empirical Investigation. *Information Systems Research*, *6*(1), 3–23.

Becerra-Fernandez, I., & Sabherwal, R. (2001). Organizational Knowledge A Contingency Management: Perspective. *Journal of Management Information Systems*, *18*(1), 23–55.

Becker, J.-M., Rai, A., Ringle, C. M., & Völckner, F. (2013). Discovering Unobserved Heterogeneity in Structural Equation Models to Avert Validity Threats. *MIS Quarterly*, *37*(3), 665–694.

Bedny, G., & Karwowski, W. (2003). A Systemic-Structural Activity Approach to the Design of Human-Computer Interaction Tasks. *International Journal of Human-Computer Interaction*, *16*(2), 235–260.

Benbasat, I., & Barki, H. (2007). Quo vadis, TAM? *Journal of the Association for Information Systems*, *8*(4), 211–218.

Benitez-Amado, J., Llorens-Montes, F. J., & Fernandez-Perez, V. (2014). *IT impact on talent management and operational environmental sustainability*.

Benson-Armer, R. J., Dobbs, R. F., & Todd, P. (2004). Putting value back in value-based management. *McKinsey Quarterly*, (March).

Bentler, P. M. (1980). Multivariate Analysis With Latent Variables: Causal Modeling. *Annual Review of Psychology*.

Bhattacherjee, A. (2001). Understanding Information Systems Continuance: An Expectation Confirmation Model. *MIS Quarterly*, *25*(3).

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices*.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *MIS Quarterly*, *28*(2), 229–254.

Bilal, D., & Jopeck, V. (2014). Young Girls' Affective Responses to Access and Use of Information and Communication Technology (ICT) in Information-Poor Societies. In *New Directions in Children's and Adolescents' Information Behavior Research* (pp.

107–133).

Blalock(Jr), H. M. (1985). *Causal models in the social sciences* (2nd ed.). New Brunswick, USA: Aldine Transaction.

Bollen, K. A. (1984). Multiple indicators: Internal consistency or no necessary relationship? *Quality and Quantity*, *18*(4), 377–385.

Box, G. E. P., & Draper, N. R. (1987). *Empirical Model-Building and Response Surfaces*. New York: John Wiley & Sons Ltd.

Bridges, W. (2003). *Managing transitions :making the most of change* (2nd ed.). Cambridge, MA: Perseus.

Brown, S. A., Massey, A. P., Montoya-Weiss, M. M., & Burkman, J. R. (2002). Do I really have to? User acceptance of mandated technology. *European Journal of Information Systems*, *11*(4), 283–295.

Bryman, A. (2007). Barriers to Integrating Quantitative and Qualitative Research. *Journal of Mixed Methods Research*, *1*(1), 8–22.

Brynjolfsson, E. (1993). The Productivity Paradox of Information Technology. *Communications of the ACM*, *36*(12).

Burnett, G., & Bonnici, L. (2003). Beyond the FAQ: Explicit and implicit norms in Usenet newsgroups. *Library & Information Science Research*, *25*(3), 333–351.

Burnett, G., Dickey, M. H., Kazmer, M. M., & Chudoba, K. M. (2003). Inscription and interpretation of text: a cultural hermeneutic examination of virtual community. *Information Research*, *9*(1), 162–174.

Burton-Jones, A., & Gallivan, M. J. (2007). Toward A Deeper Understanding of System Usage in Organizations: A Multilevel Perspective. *MIS Quarterly*, *31*(4), 657–679.

Burton-Jones, A., & Hubona, G. S. (2006). The mediation of external variables in the technology acceptance model. *Information & Management*, *43*(6), 706–717.

Chae, H., Koh, C. E., & Prybutok, V. R. (2014). Information Technology Capability and Firm Performance: Contradictory Findings And Their Possible Causes. *MIS Quarterly*, *38*(1), 305–326.

Chang, H. H. (2006). Technical and management perceptions of enterprise information system importance, implementation and benefits. *Information Systems Journal*, *16*, 263–292.

Checkland, P. (1981). *System Thinking, System Practice*. Chichester: John Wiley & Sons Ltd.

Checkland, P. (1988). The Case for “Holon.” *Systems Practice*, *1*(3), 235–238.

Checkland, P. (1995). Soft systems methodology and its relevance to the development of information systems. In *Information Systems Provision: The contribution of Soft Systems Methodology* (Vol. 1, pp. 1–17). London: MacGraw-Hill.

Checkland, P. (1999). Systems Thinking. In *Rethinking Management Information Systems* (pp. 1–9). Oxford University Press.

Checkland, P., & Howell, J. M. (1998). “Organizations”: The Main Context of Work on Information Systems. In *Origanizations: The main context of work on information* *systems* (pp. 1–14).

Checkland, P., & Poulter, J. (2006). *Learning for Action - A Short Definitive Account of Soft Systems Methodology and its use for Practitioners, Teachers and Students*.

Checkland, P., & Scholes, J. (1990). *Soft Systems Methodology in Action*. Chichester: John Wiley & Sons Ltd.

Chen, R., Sharman, R., Rao, H. R., & Upadhyaya, S. J. (2013). Data Model Development for Fire Related Extreme Events: An Activity Theory Approach. *MIS Quarterly*, *37*(1), 125–147.

Chin, W. W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly: Management Information Systems*, *22*(1), vii–xvi.

Chin, W. W., & Todd, P. a. (1995). On the use, usefulness, and ease of use of structural equation modeling in MIS research: a note of caution. *Management Information Systems Quarterly*, *19*(2), 237–246.

Chuttur, M. (2009). *Working Papers on Information Systems Overview of the Technology Acceptance Model: Origins , Developments and Future Directions* (No. 9–37) (Vol. 9).

Cobanoglu, C., & Cobanoglu, N. (2003). The effect of incentives in web surveys: Application and ethical considerations. *International Journal of Market Research*, *45*, 475–488.

Collan, M. (2007). *Lazy User Behaviour. In: Munich Personal RePEc Archive*.

Collan, M., & Tétard, F. (2011). Lazy User Model: Solution Selection and Discussion about Switching Costs. In *Nordic Contributions in IS Research* (pp. 56–68).

Compeau, D. R., & Higgins, C. A. (1995). Computer Self-Efficacy: Development of a Measure and Initial Test. *MIS Quarterly*, *19*(2), 189–212.

Cook, R. (2007). How to Spot a Failing Project. *CIO Magazine*. Retrieved from www.cio.com

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods* (4th ed.). London: Sage Publications.

Creswell, J. W., Plano Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Handbook of Mixed Methods in Social and Behavioral Research. In A. Tashakkori & C. Teddlie (Eds.), . London: Sage Publications.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334.

Cuevas-Rodríguez, G., Gomez-Mejia, L. R., & Wiseman, R. M. (2012). Has Agency Theory Run its Course?: Making the Theory more Flexible to Inform the Management of Reward Systems. *Corporate Governance: An International Review*, *20*(6), 526–546.

Davis, E. A. (2010). *The effects of technological and organizational innovations on business value in the context of a new product or service deployment*. (L. J. S. Calloway Namchul, Ed.)*ProQuest Dissertations and Theses*. Pace University, United States -- New York.

Davis, F. D. (1989). Perceived usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance Of Computer Technology: A Comparison Of Two Theoretical Models. *Management Science*, *35*(8), 982–1003.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, *22*(14), 1111–1132.

Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997). TOWARD A STEWARDSHIP THEORY OF MANAGEMENT. *Academy of Management Journal*, *22*(1), 20–47.

Davis, J. H., Schoorman, F. D., Donaldson, L., & Schoorman, D. F. (1997). Davis , Schoorman , and Donaldson Reply: The Distinctiveness of Agency Theory and Stewardship Theory. *The Academy of Management Review*, *22*(3), 611–613.

Dawson, G. S., Watson, R. T., & Boudreau, M.-C. (2010). Information Asymmetry in Information Systems Consulting: Toward a Theory of Relationship Constraints. *Journal of Management Information Systems*, *27*(3), 143–178.

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research*, *3*(1), 60–95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Success: Systems A Ten-Year Update. *Journal of Management Information Systems*, *19*(4), 9–30.

DeLone, W., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success : A Ten-Year Update. *Journal of Management Information Systems*, *19*(4), 9–30.

Dennis, A. R., & Garfield, M. J. (2003). The adoption and use of GSS in project teams: Toward more participative processes and outcomes. *MIS Quarterly*, *27*(2), 289.

Dewan, S., Shi, C., & Gurbaxani, V. (2007). Investigating the Risk–Return Relationship of Information Technology Investment: Firm-Level Empirical Analysis. *Management Science*, *53*(12), 1829–1842.

Donaldson, L., & Davis, J. H. (1991). Stewardship Theory or Agency Theory: CEO Governance and Shareholder Returns. *Australian Journal of Management*, *16*(1).

Donaldson, T. (2012). The Epistemic Fault Line in Corporate Governance. *Academy of Management Review*, *37*(2), 256–271.

Donovan, J., Tully, R., & Wortman, B. (1997). *Value Enterprise: Strategies for building a value-based organization*. (M.-H. Ryerson, Ed.). McGraw-Hill Ryerson.

Drnevich, P. L., & Croson, D. C. (2013). Information Technology and Business-Level Strategy: Toward an Integrated Theoretical Perspective. *MIS Quarterly*, *37*(2), 483–509.

Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods*, *5*(2), 155–174.

Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: a general analytical framework using moderated path analysis.

Psychological Methods, *12*(1), 1–22.

Eisenhardt, M., & Eisenhardt, K. M. (1989). Agency Theory : and Assessment Review. *Academy of Management Review*, *14*(1), 57–74.

Fama, E. F., & Jensen, M. C. (1983). Agency Problems and Residual Claims. *Journal of Law and Economics*, *26*(2).

Ferguson, C., Green, P., Vaswani, R., & Wu, G. H. (2013). Determinants of Effective Information Technology Governance. *International Journal of Auditing*, *17*(1), 75–99.

Ferguson, E., & Cox, T. (1993). Exploratory factor analysis: A users guide. *International Journal of Selection and Assessment*, *1*(2), 84–94.

Field, A., & Hole, G. (2003). *How to Design and Report Experiments*. London: Sage Publications.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*.

Fishbein, M., & Ajzen, I. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs: Prentice-Hall.

Fleming, P., & Spicer, A. (2014). Power in Management and Organization Science. *The Academy of Management Annals*, *8*(1), 237–298.

Flood, R. L. (2010). The Relationship of “Systems Thinking” to Action Research. *Systemic Practice and Action Research*, *23*(4), 269–284.

Fox, M. A., & Hamilton, R. T. (1994). Ownership and diversification: agency theory or stewardship theory. *Journal of Management Studies*, *31*(1).

Gackowski, Z. J. (2012). Focus and Perspectivism in Viewing Information, Data, and Informing: Fundamental Distinctions. *Informing Science: The International Journal of an Emerging Transdiscipline*, *15*.

Gaibraith, J. (1973). Information Processing Model. In *Designing Complex Organizations* (pp. 8–21). Addison-Wesley Publishing Company.

Gefen, D. (2003). Assessing Unidimensionality Through Lisrel: An Explanation and Example. *Communications of the Association for Information Systems*, *12*(2), 23–47.

Gefen, D. (2005). A Practical Guide to Factorial Validity Using PLS-Graph: Tutorial and Annotated Example. *Communications of the Association for Information Systems*, *16*, 91–109.

Gefen, D., Rigdon, E. E., & Straub, D. (2011). An Update and Extension to SEM Guidelines for Administrative and Social Science Research. *MIS Quarterly*, *35*(2), iii-A7.

Gefen, D., Straub, D. W., & Boudreau, M.-C. (2000). Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*, *4*(October), 7.

Gilliland, G., & Wenzky, H. (2012). *Transforming the Business Model for IT Services*.

Goh, T.-T., & Sun, S. (2014). Exploring gender differences in Islamic mobile banking acceptance. *Electronic Commerce Research*, (September).

Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report*, *8*(4), 597–606.

Goodhue, B. D. L., & Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *MIS Quarterly*, *19*(2), 213–236.

Gosling, J. (1995). *Introductory Statistics*. Singapore: Pascal Press.

Gregor, S. (2002). A Theory of Theories in Information Systems. In *Information Systems Foundations: Building the Theoretical Base* (pp. 1–18).

Gregor, S. (2006). The Nature of Theory in Information Systems. *MIS Quarterly*, *30*(3), 611–642.

Grimsley, M., & Meehan, A. (2007). e-Government information systems: Evaluation-led design for public value and client trust. *European Journal of Information Systems*, *16*(2), 134–148.

Gu, B., Xue, L., & Ray, G. (2008). *IT Infrastructure Governance and IT Investment Performance: An Empirical Analysis*.

Gurbaxani, V., & Whang, S. (1991). The Impact of Information Systems on Organizations and Markets. *Communications of the ACM*, *34*(1), 59–73.

Guzman, I. R., Stam, K. R., & Stanton, J. M. (2008). The Occupational Culture of IS/IT Personnel within Organizations. *The DATA BASE for Advances in Information Systems*, *39*(1), 33.

Hackbarth, G., Grover, V., & Yi, M. Y. (2003). Computer playfulness and anxiety: positive and negative mediators of the system experience effect on perceived ease of use. *Information & Management*, *40*(3), 221–232.

Hackney, R., Jones, S., & Lösch, A. (2007). Towards an e-Government efficiency agenda: the impact of information and communication behaviour on e-Reverse auctions in public sector procurement. *European Journal of Information Systems*, *16*(2), 178–191.

Hammer, M. (1990). Reengineering Work: Don't Automate, Obliterate. *Harvard Business Review*, (July-August), 104–112.

Harris, J. D., Johnson, S. G., & Souder, D. (2013). Model-Theoretic Knowledge Accumulation: The Case of Agency Theory and Incentive Alignment. *Academy of Management Review*, *38*(3), 442–454.

Haspeslagh, P., Noda, T., & Boulos, F. (2001). Managing for Value: It's not just about the numbers. *Harvard Business Review*, (July-August), 65–73.

Hatch, M. J., & Zilber, T. (2011). Conversation at the Border Between Organizational Culture Theory and Institutional Theory. *Journal of Management Inquiry*, *21*(1), 94–97.

Hayes, A. F. (2012). *PROCESS: A Versatile Computational Tool for Observed Variable Mediation, Moderation, and Conditional Process Modeling*. *White Paper*.

Hazzan, O., Dubinsky, Y., Eidelman, L., Sakhnini, V., & Teif, M. (2006). Qualitative Research in Computer Science Education. *Computer Science Education*, 408–412.

Heath, J. (2009). The Uses and Abuses of Agency Theory. *Business Ethics Quarterly*, *4*(October), 497–528.

Heeler, R. M., & Ray, M. L. (1972). Measure Validation in Marketing. *Journal of Marketing Research*, *9*(4), 361–370.

Hess, T. J., Mcnab, A. L., & Basoglu, K. A. (2014). Reliability Generalization of Perceived Ease of Use, Perceived Usefulness, and Behavioral Intentions. *MIS Quarterly*, *38*(1), 1–28.

Hirsch, P., Michaels, S., & Friedman, R. (1987). Dirty Hands versus Clean Models. *Theory of Society*, *16*(3), 317–336.

Ho, V. T., Ang, S., & Straub, D. (2003). When Subordinates Persistent Become IT Contractors: Managerial Expectations in IT Outsourcing. *Information Systems Research*, *14*(1), 66–86.

Hofstede, G. (1993). Cultural constraints in management theories. *Academy of Management Executive*, *7*(1), 81–94.

Howe, K. R. (2012). Mixed Methods, Triangulation, and Causal Explanation. *Journal of Mixed Methods Research*, *6*(2), 89–96.

Hoyle, R. H. (1995). *Structural Equation Modeling: Concepts, Issues, and Applications*. Thousand Oaks, California: Sage Publications.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Huber, N. (2002). Gartner: firms waste £351bn each year on ill-conceived IT projects. *ComputerWeekly.com*.

Huber, P. J. (1964). Robust estimation of a location parameter. *Annals of Mathematical Statistics*, (23), 73–101.

Iacobucci, D. (2010). Structural equations modeling: Fit Indices, sample size, and advanced topics. *Journal of Consumer Psychology*, *20*(1), 90–98.

Ihantola, E.-M., & Kihn, L.-A. (2011). Threats to validity and reliability in mixed methods accounting research. *Qualitative Research in Accounting & Management*, *8*, 39–58.

Jackson, M. C. (1991). *Systems methodology for the management sciences*. New York, NY: Plenum Press.

Jackson, M. C. (2003). *Systems Thinking: Creative Holism for Managers*. John Wiley & Sons Ltd.

Jensen, M. C. (1994). Self-Interest , Altruism , Incentives, and Agency Theory Self-Interest, Altruism, Incentives, and Agency Theory. *Journal of Applied Corporate Finance*, (August 31).

Jensen, M. C. (2005). Agency Costs of Overvalued Equity. *Financial Management*, *34*(1), 5–19.

Jiang, L., Wang, J., Ye, S., & Su, L. (2014). Application of Group Analytical Hierarchy Process on E-commerce Performance Evaluation Considering Expert Weight. *International Journal of Hybrid Information Technology*, *7*(5), 351–362.

Kagan, C., Caton, S., Amin, A., & Choudry, A. (2005). “Boundary critique” community psychology and citizen participation. In *European Community Psychology Conference* (pp. 1–33). Berlin: Research Institute for Health and Social Change.

Kant, I. (1787). *The Critique of Pure Reason*. (Translated by & J. M. D. Meiklejohn, Eds.) (2nd ed.). Hazleton: PSU-Hazleton.

Katz, D., & Kahn, R. (1966). Organizations and the system concept. *The Social Psychology of Organizations*, 1–13.

Kear, K., Donelan, H., & Williams, J. (2014). Using Wikis for Online Group Projects: Student and Tutor Perspectives. *The International Review of Research in Open and Distance Learning*, *15*(4), 70–90.

Keil, M., Im, G. P., & Mahring, M. (2007). Reporting bad news on software projects: the effects of culturally constituted views of face-saving. *Information Systems Journal*, *17*, 59–87.

Kenny, D. A. (2014). Data To Text.

King, W. R., & He, J. (2005). External validity in is survey research. *Communications of the AIS*, *16*, 880–894.

Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and avaluating interpretive field studies in information systems. *MIS Quarterly*, *23*(1), 67–94. http://doi.org/10.2307/249410

Koestler, A. (1967). *The Ghost in the Machine*. Pan Books.

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques* (Second Rev). New Delhi: New Age International (P) Ltd.

Kristekova, Z., Jurisch, C. M., Schermann, M., & Krcmar, H. (2012). Consolidating findings from business process change case studies using system dynamics: The example of employee morale. *Knowledge Management & E-Learning: An International Journal*, *4*(4), 455–480.

Kroeze, J. H. (2009). Bootstrapping an XML Schema of syntactic functions into a skeleton ontology. *South African Journal of Information Management*, *11*(September), 113–119.

Larsson, R. (1993). Case Survey Methodology: Quantitative Analysis of Patterns Across Case Studies. *Academy of Management Journal*, *36*(6), 1515–1546.

Lee, A. S. (2001). Editor’s Comments. *MIS Quarterly*, *25*(1), iii–vii.

Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The Technology Acceptance Model: Past, Present, and Future. *Communications of the AIS*, *12*(50), 752–780.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, *40*(3), 191–204.

Levins, R. (1998). Dialectics and Systems Theory. *Science & Society*, *62*(3), 375–399.

Lew, C., & Barnard, M. (2005). Overcoming the problem of value based management. *Management Today Yearbook*, 20–21.

Lewis, B. R., Templeton, G. F., & Byrd, T. A. (2005). A methodology for construct development in MIS research. *European Journal of Information Systems*, *14*(4), 388–400.

Lewis, G. (2004). Strategic Alignment: A Purposeful Perspective. In *Proceedings of the 9e Colloque de l'AIM, INT Evry* (pp. 26–28). France.

Lewis, G. (2007). A Purposeful Framework for IS. *Managing Worldwide Operations & Communications with Information Technology*, 257–261.

Lewis, M. W., Grimes, A. J., Lewis, M. W., & Grimes, A. J. (1999). Metatriangulation: Building Theory From Multiple Paradigms. *Academy of Management Review*, *24*(4), 672–690.

Lillis, A. M. (2006). Methodological Issues in Accounting Research: Theories and Methods. In Z. Hoque (Ed.), *Reliability and validity in field study research* (pp. 461–480). London: Piramus.

Linder, S., & Foss, N. J. (2013). *Agency Theory* (No. SMG WP 7/2013).

Lundqvist, S. A. (2014). An Exploratory Study of Enterprise Risk Management: Pillars of ERM. *Journal of Accounting, Auditing & Finance*, *29*(3), 393–429.

Maes, K., De Haes, S., & Van Grembergen, W. (2011). How IT Enabled Investments Bring Value to the Business: A Literature Review. In *44th Hawaii International Conference on System Sciences* (pp. 1–10). Ieee.

Makarević, N., Secim, H., & Toycan, M. (2014). IT-Security of E-Banking in Eyes of Croatian Clients. *European Journal of Social and Human Sciences*, *2*(2), 81–89.

Malinovski, T., Vasileva, M., Vasileva-Stojanovska, T., & Trajkovik, V. (2014). Considering High School Students' Experience in Asynchronous and Synchronous Distance Learning Environments: QoE Prediction Model. *International Review of Research in Open and Distance Learning*, *15*(4), 91–122.

Marcoulides, G. A., & Schumacker, R. E. (1996). *Advanced structural Equation Modelling: Issues and Techniques*. New Jersey: Lawrence Erlbaum Associates.

Marnewick, C., & Labuschagne, L. (2009). Deriving projects from the organisational vision using the Vision-to-Projects (V2P) Framework. *Southern African Business Review*, *13*(3), 119–146.

Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research*, *2*(3), 173–191.

McClelland, D. C., & Burnham, D. H. (1976). Power is the great motivator. *Harvard Business Review*, *54*(March-April), 100–110.

Mehmood, N., Shah, M. F., Azhar, M., & Rasheed, A. (2014). The Factors Effecting E-banking Usage in Pakistan. *Journal of Management Information System and E-Commerce*, *1*(1), 57–94.

Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Review: Information Technology And Organizational Performance: An Integrative Model of IT Business Value. *MIS Quarterly*, *28*(2), 283–322.

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (Fourth). San Francisco: Jossey-Bass.

Midgley, G., Munlo, I., & Brown, M. (1998). The theory and practice of boundary critique : developing housing services for older people. *The Journal of the Operational Research Society*, *49*(5), 467–478.

Miles, M. B., & Huberman, A. M. (1984). *Qualitative Data Analysis - A Sourcebook of New Methods*. London: Sage Publications.

Mingers, J. (2001). Combining IS Research Methods: Towards a Pluralist Methodology. *Information Systems Research*, *12*(3), 240–259.

Mingers, J., & White, L. (2009). *A Review of the Recent Contribution of Systems Thinking to Operational Research and Management Science* (Vol. 7595).

Mithas, S., Tafti, A., & Bardhan, I. (2012). Information Technology and Firm Profitability: Mechanisms And Empirical Evidence. *MIS Quarterly*, *36*(1), 205–224.

Mitra, S., Sambamurthy, V., & Westerman, G. (2011). Measuring IT Performance and Communicating Value. *MIS Quarterly Executive*, *10*(1), 47–60.

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, *2*(3), 192–222.

Mouton, J. (2001). *How to succeed in your Masters & Doctoral Studies*. Pretoria: Van Schaik Publishers.

Murer, S., Bonati, B., & Furrer, F. J. (2011). *Managed Evolution: A Strategy for Very Large Information Systems*. *Journal of Chemical Information and Modeling* (Vol. 53). Heidelberg: Springer-Verlag.

Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. California: Sage Publications.

Neumann, K. (2013). “Know Why” thinking as a new approach to systems thinking. *E:CO*, *15*(3), 81–93.

Nevo, S., & Wade, M. (2008). Development and validation of scales to measure the strategic potential of IT-enabled resources: A resource-based approach. *… on System Sciences, Proceedings of the …*, 1–10.

Nevo, S., & Wade, M. R. (2010). The Formation and Value Of IT-Enabled Resources: Antecedents And Consequences Of Synergistic Relationships. *MIS Quarterly*, *34*(1), 163–183.

Newman, S., & Peery, J. R. (1972). General Systems Theory: An Inquiry into Its Social Philosophy. *Academy of Management Journal*, *15*(4), 495–510.

Oates, B. J. (2006). *Researching Information Systems and Computing*. London: Sage Publications.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, *17*(4).

Onwuegbuzie, A. J., & Johnson, R. B. (2006). The Validity Issue in Mixed Research. *Research in the Schools*, *13*(1), 48–63.

Onwuegbuzie, A. J., & Leech, N. L. (2009). 2009 Conclusion - Lessons learned for teaching mixed research: A framework for novice researchers. *International Journal* *of Multiple Research Approaches*, *3*(1), 105–107.

Orlikowski, W. J., & Iacono, C. S. (2001). Research Commentary: Desperately Seeking “IT” in IT Research — A Call to Theorizing the IT Artifact. *Information Systems Research*, *12*(2), 121–134.

Padayachee, K. (2014). *An Insider Threat Neutralisation Mitigation Model Predicated On Cognitive Dissonance (ITNMCD)*.

Pantano, E., & Migliarese, P. (2014). Exploiting consumer–employee–retailer interactions in technology-enriched retail environments through a relational lens. *Journal of Retailing and Consumer Services*, *21*(6), 958–965.

Peppard, J., & Ward, J. (2005). Unlocking Sustained Business Value from IT Investments. *California Management Review*, *48*(1), 52–70.

Perrow, C. (1986). Economic Theories of Organization. *Theory and Society*, *15*, 11–45.

Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly*, *31*(4), 623–656. http://doi.org/10.2307/25148814

Pfeffer, J., & Sutton, R. (2000). *The knowing-doing gap: How smart companies turn knowledge into action*. *de Wit, R. and Meyer, R.: Strategy: process, content, …*.

Piccoli, G., & Ives, B. (2003). Trust and the Unintended Effects of Behavior Control in Virtual Teams. *MIS Quarterly*, *27*(3), 365–396.

Pinsonneault, A., & Rivard, S. (1998). Information Technology and the Nature of Managerial Work: From the Productivity Paradox to the Icarus Paradox? *MIS Quarterly*, *22*(3), 287–311.

Porra, J. (2001). A Dialogue with C . West Churchman. *Information Systems Frontiers*, *3*(1), 19–27.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, *36*(4), 717–731.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891.

Rao, V., & Ramachandran, S. (2011). Occupational Cultures of Information Systems Personnel and Managerial Personnel: Potential Conflicts. *Communications of the Association for Information Systems*, *29*(December), 581–604.

Reason, P. (1994). *Participation in human inquiry*. London: Sage Publications.

Reynolds, M. (2005). Churchman and Maturana: Enriching the Notion of Self-Organization for Social Design. *Systemic Practice and Action Research*, *17*(6), 539–556.

Reynolds, M. (2008). Getting a Grip : Critical Systems for Corporate Responsibility. *Systems Research and Behavioural Sciences*, *395*, 383–396.

Roberts, J. P. (2002). *The Elusive Business Value of IT*. *Gartner*.

Robey, D., & Markus, L. M. (1984). Rituals In Information System Design. *MIS Quarterly*, *8*(1), 5–16.

Rossiter E, J. (2002). The C-OA-SE procedure for scale development in marketing. *International Journal of Research in Marketing*, *19*(4), 30.

Salimon, M. G., Zien, Y. R., & Abdullateef, A. O. (2014). The Mediating Effects of e-Satisfaction on the Relationship between e- Banking Adoption and its Determinants: A Conceptual Framework. *Journal of Management Information System and E-Commerce*, *1*(1), 95–105.

Sam, C. (2012). Activity Theory and Qualitative Research in Digital Domains. *Theory Into Practice*, *51*(2), 83–90.

Sandelowski, M. (2001). Real qualitative researchers don’t count: The use of numbers in qualitative research. *Research in Nursing and Health*, *24*, 230–240.

Saricam, C. (2014). Acceptance of apparel private sale sites by consumers: application of original and extended technology acceptance model. *The Journal of The Textile Institute*, (October), 1–12.

Schryen, G. (2013). Revisiting IS business value research: What we already know, what we still need to know, and how we can get there. *European Journal of Information Systems*, *22*, 139–169.

Scribner, S. (1984). Cognitive Studies of Work. *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition*, *6*(1–2), 1–50.

Senge, P. M. (1990). *The Fifth Discipline: The art and practice of the learning organization*. Currency Dubleday.

Sharma, A. (1997). Professional as Agent: Knowledge Asymmetry in Agency Exchange. *The Academy of Management Review*, *22*(3), 758–798.

Silver, M. S., Markus, M. L., & Beath, C. M. (1995). The information technology interaction model: A foundation for the MBA core course. *MIS Quarterly*, *19*(3), 361–390.

Sireci, S. G. . (1998). The Construct of Content Validity. *Social Indicators Research*, *45*(1/3), 83–117.

Smeda, A. M., Shiratuddin, M. F., & Wong, K. W. (2014). A Proposed Framework of the Adoption of E-book Amongst Mathematics and Statistics Students at Universities in Libya. In *Scientific Conference* (pp. 509–514).

Smith, H. A., Canada, K., Mckeen, J. D., Cranston, C., & Benson, M. (2010). Investment Spend Optimization: A New Approach to IT Investment at BMO Financial Group. *MIS Quarterly Executive*, *9*(2), 65–82.

Soffer, P., & Hadar, I. (2007). Applying ontology-based rules to conceptual modeling: a reflection on modeling decision making. *European Journal of Information Systems*, *16*(5), 599–611.

Soh, C., & Markus, M. (1995). How IT creates business value: a process theory synthesis. *ICIS*.

Somers, T. M., Nelson, K., & Karimi, J. (2003). Confirmatory Factor Analysis of the End-User Computing Satisfaction Instrument: Replication within an ERP Domain. *Decision Sciences*, *34*(3), 595–622.

Spearman, C. (1904). The Proof and Measurement of Association between Two Things.

The American Journal of Psychology, *15*(1), 72–101.

Straub, D., Boudreau, M.-C., & Gefen, D. (2004). Validation Guidelines for IS Positivist Research. *Communications of the Association for Information Systems*, *13*, 380–427.

Straub, D., Limayem, M., & Karahanna-Evaristo, E. (1995). Measuring system usage: Implications for IS theory testing. *Management Science*, *41*(8), 1328–1342.

Straub, D. W. (1989). Validating Instruments in MIS Research. *MIS Quarterly*, *13*(2), 147–169.

Strong, D., & Volkoff, O. (2010). Understanding Organization--Enterprise System Fit: A Path to Theorizing The Information Technology Artifact. *MIS Quarterly*, *34*(4), 731–756.

Suddaby, R. (2010). Challenges for Institutional Theory. *Journal of Management Inquiry*, *19*(1), 14–20.

Sue, V. M., & Ritter, L. A. (2007). *Conducting Online Surveys*. Thousand Oaks: Sage Publications.

Suhr, D. (2006). The basics of Structural Equation Modelling. *Accessed at URL on 16 August 2015:*, 1–19.

Sukhoo, A., Barnard, A., Eloff, M., & Poll, J. Van der. (2004). Towards a framework for evaluating strengths and weaknesses of software projects. In *Proceedings of the 2004 PMSA International Conference* (pp. 193–199). Retrieved from http://uir.unisa.ac.za/handle/10500/2662

Taylor, S., & Todd, P. (1995). Assessing IT Usage: The Role of Prior Experience The Influence of Prior Experience. *MIS Quarterly*, *19*(4).

Tétard, F., & Collan, M. (2009). Lazy User Theory: A Dynamic Model to Understand User Selection of Products and Services. In *Proceedings of the 42nd Hawaii International Conference on System Sciences* (pp. 1–9).

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, *15*(1), 125–144.

Thota, N., Berglund, A., & Clear, T. (2012). Illustration of paradigm pluralism in computing education research. *ACE '12 Proceedings of the Fourteenth Australasian Computing Education Conference*, 103–112.

Torkzadeh, G., Koufteros, X., & Pflughoeft, K. (2003). Confirmatory Analysis of Computer Self-Efficacy. *Structural Equation Modeling: A Multidsciplinary Journal*, *10*(2), 214–221.

Tsai, Y.-R., & Chang, Y. (2014). Enhancing Engineering Students' Reading Comprehension of English for Science and Technology With the Support of an Online Cumulative Sentence Analysis System. *SAGE Open*, *4*(3).

Turban, E., Bolloju, N., & Liang, T. (2010). Social Commerce: An E-Commerce Perspective. In *ICEC* (pp. 33–42).

Turban, E., & Volonino, L. (2010). Managing IT projects, process improvement, and organizational change. In *Information Technology for Management: Transforming organizations in the digital economy*.

Ulrich, W. (1987). Critical heuristics of social systems design. *European Journal of Operational Research*, *31*, 276–283.

Ulrich, W. (1988). Systems thinking, systems practice, and practical philosophy: A program of research. *Systems Practice*, *1*(2), 137–163.

Ulrich, W. (2000). Reflective Practice in the Civil Society: The Contribution of Critically Systemic Thinking. *Reflective Practice*, *1*(2), 247–268.

Ulrich, W. (2002). Boundary Critique. In *The Informed Student Guide to Management Science* (p. 41).

Ulrich, W. (2003). Beyond methodology choice: critical systems thinking as critically systemic discourse. *Journal of the Operational Research Society*, *54*(4), 325–342.

Ulrich, W. (2005). *A Brief Introduction to Critical Systems Heuristics (CSH)* (ECOSENSUS project website). Milton Keynes, UK.

Ulrich, W., & Reynolds, M. (2010). Critical Systems Heuristics. In M. Reynolds & S. Holwell (Eds.), *Systems Approaches to Managing Change: A Practical Guide* (pp. 243–292). London: Springer London.

Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application*, *11*(2), 5–40.

Urbach, N., & Müller, B. (2012). The Updated DeLone and McLean Model of Information Systems Success. In Y. K. Dwivedi, M. R. Wade, & S. L. Schneberger (Eds.), *Information Systems Theory: Explaining and Predicting Our Digital Society* (Vol. 28, pp. 1–18). New York, NY: Springer New York. http://doi.org/10.1007/978-1-4419-6108-2

Val-IT. (2008). *Enterprise Value: Governance of IT Investments – The Val IT Framework 2.0*. (U. IT Governance Institute, Rolling Meadows, IL, Ed.).

Van Biljon, J. (2011). A critical review on the reporting of surveys in transdisciplinary research: a case study in Information Systems. *Td The Journal for Transdisciplinary Research in Southern Africa*, *7*(December), 337–350.

Van der Stede, W. a., Young, S. M., & Chen, C. X. (2005). Assessing the quality of evidence in empirical management accounting research: The case of survey studies. *Accounting, Organizations and Society*, *30*(7–8), 655–684.

Venkatesh, V. (1999). Creation of Favorable User Perceptions: Exploring the Role of Intrinsic Motivation. *MIS Quarterly*, *23*(2), 239–260.

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, *11*(4), 342–365.

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the Qualitative – Quantitative Divide: Guidelines for Conducting Mixed Methods. *MIS Quarterly*, *37*(1), 21–54.

Venkatesh, V., & Davis, F. D. (1996). A Model of the Antecedents of Perceived Ease of Use: Development and Test. *Decision Sciences*, *27*(3), 451–481.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, *46*(2), 186–204.

Venkatesh, V., Davis, F. D., & Morris, M. G. (2007). Dead Or Alive? The Development, Trajectory and Future of Technology Dead or Alive? The Development, Trajectory and Future of Technology Adoption Research. *Journal of the Association for Information Systems*, *8*(4), 267–286.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425–478.

Vidgen, R., Wood-Harper, T., & Wood, R. (1993). A soft systems approach to information systems quality. *Journal of Information Systems*.

Von, Bertalanffy, L. (1972). The History and Status of General Systems Theory. *He Academy of Management Journal*, *15*(4), 407–426.

Walker, R. L. (1985). *Applied Qualitative Research*. Aldershot: Gower Publishing.

Wetzels, M., Odekerken-Schröder, G., & Oppen, C. van. (2009). Using PLS path modelling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, *33*(1), 177–195.

Willis, G. B. (2005). *Cognitive interviewing: A tool for improving questionnaire design*. California: Sage Publications.

Willison, R., & Siponen, M. T. (2009). Overcoming the Insider: Reducing Employee Computer Crime Through Situational Crime Prevention. *Communications of the ACM*, *52*(9), 133–137.

Wixom, B. H., & Todd, P. A. (2005). A Theoretical Integration of User Satisfaction and Technology Acceptance. *Information Systems Research*, *16*(1), 85–102.

Xu, Y. (2007). The Dynamics of Interactive Information Retrieval Behavior, Part I: An Activity Theory Perspective. *Journal of the American Society for Information Science and Technology*, *58*(7), 958–970.

Yang, H., & Yoo, Y. (2003). It's all about attitude: revisiting the technology acceptance model. *Decision Support Systems*, *38*(1), 19–31.

Yeboah, M. A., Ansong, M. O., Aboagye, E. O., Antwi, H. A., & Yiranbon, E. (2014). Diffusion of E-Learning Technologies among Medical Students in Ghana: An Empirical Analysis. *American International Journal of Contemporary Research*, *4*(6), 81–90.

Yen, Y.-S. (2014). A comparison of quality satisfaction between transactional and relational customers in e-commerce. *The TQM Journal*, *26*(6), 577–593.

Yi Jin, L., Bin Osman, A., & Suberi Bin AB.Halim, M. (2014). Perceived Usefulness and Trust Towards Consumer Behaviors: A Perspective of Consumer Online Shopping. *Journal of Asian Scientific Research*, *4*(10), 541–546.

Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007a). Technology acceptance: a meta-analysis of the TAM: Part 1. *Journal of Modelling in Management*, *2*(3), 251–280.

Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007b). Technology acceptance: a meta-analysis of the TAM: Part 2. *Journal of Modelling in Management*, *2*(3), 281–304.

Zexian, Y., & Xuhui, Y. (2010). A Revolution in the Field of Systems Thinking — A Review of Checkland ' s System Thinking. *Systems Research and Behavioural Science*, *27*, 140–156.

Zhang, L., Nyheim, P., & Mattila, A. S. (2014). The effect of power and gender on technology acceptance. *Journal of Hospitality and Tourism Technology*, *5*(3), 1–34.

Zilber, T. B. (2011). The Relevance of Institutional Theory for the Study of Organizational Culture. *Journal of Management Inquiry*, *21*(1), 88–93.

LIST OF ABBREVIATIONS

COBIT®	Control Objectives for Information and related Technology
IS	Information System(s)
IT	Information Technology
ITGI	Information Technology Governance Institute
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
Val-IT™	Value Information Technology Framework
VDF	Value Dissipation Framework

APPENDIX A: SYSTEM CONCEPTS AND TERMS (ACKOFF, 1971)

The table below provides a list of common system concepts and terms prevalent in the systems thinking literature.

1	System	A set of interrelated elements. Thus a system is an entity which is composed of at least two elements and a relation that holds between each of its elements and at least one other element in the set. Each of a system's elements is connected to every other element, directly or indirectly. Furthermore, no subset of elements is unrelated to any other subset.
2	Abstract system	A system, all of whose elements are concepts. Languages, philosophic systems, and number systems are examples. Numbers are concepts but the symbols that represent them, numerate, are physical things. Numerals, however, are not the elements of a number system. The use of different numerals to represent the same numbers does not change the nature of the system. In an abstract system the elements are created by defining and the relationships between them are created by assumptions (e.g., axioms and postulates). Such systems, therefore, are the subject of study of the so-called 'formal sciences'.
3	Concrete system	A system, at least two of whose elements are objects. It is only with such systems that we are concerned here. Unless otherwise noted, 'system' will always be used to mean 'concrete system'. In concrete systems establishment of the existence and properties of elements and the nature of the relationships between them requires research with an empirical component in it. Such systems, therefore, are the subject of study of the so-called 'non-formal' sciences.
4	State of a system	At a moment of time is the set of relevant properties which that system has at that time. Any system has an unlimited number of properties. Only some of these are relevant to any particular research. Hence those which are relevant may change with changes in the purpose of the research. The values of the relevant properties constitute the state of the system. In some cases we may be interested in only two possible states (e.g., off and on or awake and asleep). In other cases we may be interested in a large or unlimited number of possible states (e.g., a system's velocity or weight).
5	Environment of a system	A set of elements and their relevant properties, which elements are not part of the system but a change in any of which can produce a change in the state of the system. Thus a system's environment consists of all variables which can affect its state. External elements which affect irrelevant properties of a system are not part of its environment.
6	State of a system's environment	At a moment of time is the set of its relevant properties at that time. The state of an element or subset of elements of a system or its environment may be similarly defined. Although concrete systems and their environments are objective things, they are also subjective insofar as the particular configuration of elements that form both is dictated by the interests of the researcher. Different observers of the same phenomena may conceptualize them into different systems and environments.

		The elements that form the environment of a system and the environment itself may be conceptualized as systems when they become the focus of attention. Every system can be conceptualized as part of another and larger system. Even an abstract system can have an environment. For example, the meta-language in which we describe a formal system is the environment of that formal system. Therefore logic is the environment of mathematics.
7	Closed system	A system that has no environment. An open system is one that does. Thus a closed system is one which is conceptualized so that it has no interaction with any element not contained within it; it is completely self-contained. Because systems researchers have found such conceptualizations of relatively restricted use, their attention has increasingly focused on more complex and 'realistic' open systems. 'Openness' and 'closedness' are simultaneously properties of systems and our conceptualizations of them. Systems may or may not change over time.
8	A system (or environmental) event	A change in one or more structural properties of the system (or its environment) over a period of time of specified duration; that is, a change in the structural state of the system (or environment). For example, an event occurs to a house's lighting system when a fuse blows, and to its environment when night falls.
9	A static (one-state) system	A system to which no events occur. A table, for example, can be conceptualized as a static concrete system consisting of four legs, top, screws, glue, and so on. Relative to most research purposes it displays no change of structural properties, no change of state. A compass may also be conceptualized as a static system because it virtually always points to the Magnetic North Pole.
10	A dynamic (multi-state) system	A system to which events occur, whose state changes over time. An automobile which can move forward or backward and at different speeds is such a system or a motor which can be either off or on. Such systems can be conceptualized as either open or closed; closed if its elements react or respond only to each other.
11	A homeostatic system	A static system whose elements and environment are dynamic. Thus a homeostatic system is one that retains its state in a changing environment by internal adjustments. A house that maintains a constant temperature during changing external temperatures is homeostatic. The behaviour of its heating subsystem makes this possible. Note that the same object may be conceptualized as either a static or dynamic system.
System Changes		
12	A reaction of a system	A system event for which another event that occurs to the same system or its environment is sufficient. Thus a reaction is a system event that is deterministically caused by another event. For example, if an operator's moving a motor's switch is sufficient to turn that motor off or on, then the change of state of the motor is a reaction to the movement of its

		switch. In this case, the turning of the switch may be necessary as well as sufficient for the state of the motor. But an event that is sufficient to bring about a change in a system's state may not be necessary for it. For example, sleep may be brought about by drugs administered to a person or it may be self-induced. Thus sleep may be determined by drugs but need not be.
13	A response of a system	A system event for which another event that occurs to the same system or to its environment is necessary but not sufficient; that is, a system event produced by another system or environmental event (the stimulus). Thus a response is an event of which the system itself is a co-producer. A system does not have to respond to a stimulus, but it does have to react to its cause. Therefore, a person's turning on a light when it gets dark is a response to darkness, but the light's going on when the switch is turned is a reaction.
14	An act of a system	A system event for the occurrence of which no change in the system's environment is either necessary or sufficient. Acts, therefore, are self-determined events, autonomous changes. Internal changes—in the states of the system's elements—are both necessary and sufficient to bring about action. Much of the behaviour of human beings is of this type, but such behaviour is not restricted to humans. A computer, for example, may have its state changed or change the state of its environment because of its own program. Systems all of whose changes are reactive, responsive or autonomous (active) can be called reactive, responsive or autonomous (active), respectively. Most systems, however, display some combination of these types of change. The classification of systems into reactive, responsive, and autonomous is based on consideration of what brings about changes in them. Now let us consider systems with respect to what kind of changes in themselves and their environments their reactions, responses, and actions bring about.
15	A system's behaviour	A system event(s) which is either necessary or sufficient for another event in that system or its environment. Thus behaviour is a system change which initiates other events. Note that reactions, responses, and actions may themselves constitute behaviour. Reactions, responses, and actions are system events whose antecedents are of interest. Behaviour consists of system events whose consequences are of interest. We may, of course, be interested in both the antecedents and consequences of system events.
16	A state-maintaining system	A system that (1) can react in only one way to any one external or internal event but (2) it reacts differently to different external or internal events, and (3) these different reactions produce the same external or internal state (outcome). Such a system only reacts to changes; it cannot respond because what it does is completely determined by the causing event. Nevertheless it can be said to have the function of maintaining the state it produces because it can produce this state in different ways under different conditions. Thus a heating system whose internal

		controller turns it on when the room temperature is below a desired level, and turns it off when the temperature is above this level, is state-maintaining. The state it maintains is a room temperature that falls within a small range around its setting. Note that the temperature of the room which affects the system's behaviour can be conceptualized as either part of the system or part of its environment. Hence a state-maintaining system may react to either internal or external changes. In general, most systems with 'stats' (e.g., thermostats and humidistats) are state-maintaining. Any system with a regulated output (e.g., the voltage of the output of a generator) is also state-maintaining. A compass is also state-maintaining because in many different environments it points to the Magnetic North Pole. A state-maintaining system must be able to discriminate between different internal or external states to changes in which it reacts. Furthermore, as we shall see below, such systems are necessarily adaptive, but unlike goal-seeking systems they are not capable of learning because they cannot choose their behaviour. They cannot improve with experience.
17	Goal-seeking system	A system that can respond differently to one or more different external or internal events in one or more different external or internal states and that can respond differently to a particular event in an unchanging environment until it produces a particular state (outcome). Production of this state is its goal. Thus such a system has a choice of behaviour. A goal-seeking system's behaviour is responsive, but not reactive. A state which is sufficient and thus deterministically causes a reaction cannot cause different reactions in the same environment. Under constant conditions a goal-seeking system may be able to accomplish the same thing in different ways and it may be able to do so under different conditions. If it has memory, it can increase its efficiency over time in producing the outcome that is its goal. For example, an electronic maze-solving rat is a goal-seeking system which, when it runs into a wall of a maze, turns right and if stopped again, goes in the opposite direction, and if stopped again, returns in the direction from which it came. In this way it can eventually solve any solvable maze. If, in addition, it has memory, it can take a 'solution path' on subsequent trials in a familiar maze. Systems with automatic 'pilots' are goal-seeking. These and other goal-seeking systems may, of course, fail to attain their goals in some situations. The sequence of behaviour which a goal-seeking system carries out in quest of its goal is an example of a process.
18	A process	A sequence of behaviour that constitutes a system and has a goal-producing function. In some well-definable sense each unit of behaviour in the process brings the actor closer to the goal which it seeks. The sequence of behaviour that is performed by the electronic rat constitutes a maze-solving process. After each move the rat is closer (i.e., has reduced the number of moves required) to solve the maze. The

		metabolic process in living things is a similar type of sequence the goal of which is acquisition of energy or, more generally, survival. Production processes are a similar type of sequence whose goal is a particular type of product. Process behaviour displayed by a system may be either reactive, responsive or active.
19	A multi-goal-seeking system	A system that is goal-seeking in each of two or more different (initial) external or internal states, and which seeks different goals in at least two different states, the goal being determined by the initial state.
20	A purposive system	Multi-goal-seeking system the different goals of which have a common property. Production of that common property is the system's purpose. These types of system can pursue different goals but they do not select the goal to be pursued. The goal is determined by the initiating event. But such a system does choose the means by which to pursue its goals. A computer which is programmed to play more than one game (e.g., tic-tac-toe and checkers) is multi-goal-seeking. What game it plays is not a matter of its choice, however; it is usually determined by an instruction from an external source. Such a system is also purposive because 'game winning 'is a common property of the different goals which it seeks.
21	A purposeful system	A system which can produce the same outcome in different ways in the same (internal or external) state and can produce different outcomes in the same and different states. Thus a purposeful system is one which can change its goals under constant conditions; it selects ends as well as means and thus displays will. Human beings are the most familiar examples of such systems. Ideal-seeking systems form an important subclass of purposeful systems. Before making their nature explicit we must consider the differences between goals, objectives, and ideals and some concepts related to them. The differences to be considered have relevance only to purposeful systems because only they can choose ends. A system which can choose between different outcomes can place different values on different outcomes.
22	The relative value of an outcome	The relative value of an outcome that is a member of an exclusive and exhaustive set of outcomes, to a purposeful system, is the probability that the system will produce that outcome when each of the set of outcomes can be obtained with certainty. The relative value of an outcome can range from 0 to 1.0. That outcome with the highest relative value in a set can be said to be preferred.
23	The goal	The goal of a purposeful system in a particular situation is a preferred outcome that can be obtained within a specified time period.
24	The objective	The objective of a purposeful system in a particular situation is a preferred outcome that cannot be obtained within a specified period but which can be obtained over a longer time period. Consider a set of possible outcomes ordered along one or more scales (e.g., increasing speeds of travel). Then each outcome is closer to the final one than

		those which precede it. Each of these outcomes can be a goal in some time period after the 'preceding' goal has been obtained, leading eventually to attainment of the last outcome, the objective. For example, a high-school freshman's goal in his first year is to be promoted to his second (sophomore) year. Passing his second year is a subsequent goal. And so on to graduation, which is his objective. Pursuit of an objective requires an ability to change goals once a goal has been obtained. This is why such pursuit is possible only for a purposeful system.
25	An ideal	An objective which cannot be obtained in any time period but which can be approached without limit. Just as goals can be ordered with respect to objectives, objectives can be ordered with respect to ideals. But an ideal is an outcome which is unobtainable in practice, if not in principle. For example, an ideal of science is errorless observations. The amount of observer error can be reduced without limit but can never be reduced to zero. Omniscience is another such ideal.
26	An ideal-seeking system	A purposeful system which, on attainment of any of its goals or objectives, then seeks another goal and objective which more closely approximates its ideal. An ideal-seeking system is thus one which has a concept of 'perfection' or the 'ultimately desirable' and pursues it systematically; that is, in interrelated steps. From the point of view of their output, six types of system have been identified: state-maintaining, goal-seeking, multi-goal-seeking, purposive, purposeful, and ideal-seeking. The elements of systems can be similarly classified. The relationship between (1) the behaviour and type of a system and (2) the behaviour and type of its elements is not apparent. We consider it next.

APPENDIX B: MIXED METHODS RESEARCH GUIDELINES (VENKATESH *ET AL.*, 2013)

Area	Guideline	Author Considerations	Editor/Reviewer Evaluations
General Guidelines	1. Decide on the appropriateness of a mixed methods approach.	Carefully think about the research questions, objectives, and contexts to decide on the appropriateness of a mixed methods approach for the research. Explication of the broad and specific research objective is important to establish the appropriateness and utility of mixed methods research.	Understand the core objective of a research inquiry to assess whether mixed methods research is appropriate for an inquiry. For example, if the theoretical/causal mechanisms/processes are not clear in a quantitative paper, after carefully considering the practicality, ask authors to collect qualitative data (e.g., interview, focus groups) to unearth these mechanisms and processes.
	2. Develop a strategy for mixed methods research design.	Carefully select a mixed methods design strategy that is appropriate for the research questions, objectives, and contexts.	Evaluate the appropriateness of a mixed methods research design from two perspectives: research objective and theoretical contributions. For example, if the objective of a research inquiry is to identify and test theoretical constructs and mechanisms in a new context, a qualitative study followed by a quantitative study is appropriate (i.e. sequential design).
	3. Develop a strategy for analysing mixed-methods data.	Develop a strategy for rigorously analysing mixed methods data. A cursory analysis of qualitative data followed by a rigorous analysis of quantitative data, or vice versa, is not desirable.	While recognizing the practical challenges of collecting, analysing, and reporting both qualitative and quantitative data in a single research inquiry, apply the same standards for rigor as would typically be applied in evaluating the analysis quality of other quantitative and qualitative studies.
	4. Draw meta-inferences from mixed methods results.	Integrate inferences from the qualitative and quantitative studies in order to draw meta-inferences.	Ensure that authors draw meta-inferences from mixed methods research. Evaluation of meta-inferences should be done from the perspective of the research objective and theoretical contributions to make sure the authors draw and report appropriate meta-inferences.

Area	Guideline	Author Considerations	Editor/Reviewer Evaluations
Validation	5. Discuss validation within quantitative and qualitative research.	Discuss validation for both quantitative and qualitative studies.	Ensure that authors follow and report validity types that are typically expected in a quantitative study. For the qualitative study, ensure that the authors provide either explicit or implicit (e.g., rich and detailed description of the data collection and analyses) discussion of validation.
	6. Use mixed methods research nomenclature when discussing validation.	When discussing mixed methods validation, use mixed methods research nomenclature.	Ensure that the authors use consistent nomenclature for reporting mixed methods research validation.
	7. Discuss validation of mixed methods findings and/or meta-inference(s).	Mixed methods research validation should be assessed on the overall findings from mixed methods research, not from the individual studies.	Assess the quality of integration of qualitative and quantitative results. The quality should be assessed in light of the theoretical contributions.
	8. Discuss validation from a research design point of view.	Discuss validation from the standpoint of the overall mixed methods design chosen for a study or research inquiry.	Assess the quality of meta-inferences from the standpoint of the overall mixed methods design chosen by IS researchers (e.g., concurrent or sequential).
	9. Discuss potential threats and remedies.	Discuss the potential threats to validity that may arise during data collection and analysis.	Evaluate the discussion of potential threats using the same standard that is typically used in rigorously conducted qualitative and quantitative studies.

APPENDIX C: STRUCTURAL EQUATION MODELLING CONCEPTS AND TERMS

Concept/ Term	Description[7]
ANOVA	Analysis of Variance describes a univariate analysis of variance technique. Statistical technique to determine, on the basis of one dependent measure, whether samples are from populations with equal means.
Factor Analysis	Factor analysis tries to explain the set of correlations or covariances represented in the data. Factor analysis is thus concerned with covariance and is distinct from principal components analysis which is concerned with variance. The factors in factor analysis are typically latent variables.
Exploratory Factor Analysis	An analysis in which there is no prior specification of the number of factors is exclusively exploratory. Using a maximum likelihood (ML) or generalized least squares (GLS) exploratory program represents the next step in the progression, in that a hypothesized number of underlying factors can be specified and the goodness of fit of the resulting solution can be tested.
Confirmatory Factor Analysis	A confirmatory measurement, or factor analysis, model specifies the relations of the observed measures to their posited underlying constructs, with the constructs allowed to intercorrelate freely. A confirmatory structural model then specifies the causal relations of the constructs to one another, as posited by some theory.
Endogenous Variables	Variables that are influenced by other variables. For every endogenous variable a residual term should be added in the model, i.e. an 'error', denoted as a circle with an "e" inside.
Exogenous Variables	Variables that are not influenced by other variables.
Manifest/ Indicator Variable	Variables that are **directly observed**/ measured, **denoted by rectangles**.
Path Analysis	Structural Equation Modelling only examining manifest variables.
Latent Variables	Variables that are **not directly observed**/ measured, **denoted by ovals**. If the latent variable is endogenous, a residual term should be added to the model, i.e. a "Disturbance", denoted as a circle with a "D" inside.
Moderation	The situation that exists between three or more variables where the presence of one variable changes the relationship between the other variables.
Mediation	The situation that exists between three or more variables where there is a causal relationship between the variables. In this situation there is not only a direct effect between the independent variable and the

[7] ADAPTED FROM: (J. C. ANDERSON & GERBING, 1988; CHIN & TODD, 1995; JEFFREY R EDWARDS & LAMBERT, 2007; E. FERGUSON & COX, 1993; GEFEN *ET AL.*, 2000; GOSLING, 1995; HU & BENTLER, 1999; PETTER, STRAUB, & RAI, 2007; SUHR, 2006; URBACH & AHLEMANN, 2010; WETZELS, ODEKERKEN-SCHRÖDER, & OPPEN, 2009)

	dependent variable, but also indirect effects between respectively the independent variable and the mediator variable and between the latter and the dependent variable.
Correlation Analysis	Is concerned with determining the extent to which the variables of interest are related. It is a procedure that provides a measure of the relative strength of the relationship.
Covariance	A measure of how much two random variables vary together and only allowed for exogenous variables.
Regression Analysis	A statistical technique that can be used to develop a mathematical equation that relates the known variable(s) to the unknown variable.
Structural Model	Part of the entire Structural Equation Modelling diagram, inclusive of all manifest and latent variables. Prescribes relations between latent variables and observed variables that are not indicators of latent variables.
Structural Equation Modelling	Multivariate technique combining aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts with multiple variables) to estimate a series of interrelated dependence relationships simultaneously.
Measurement Model	Prescribes latent variables, e.g., confirmatory factor analysis. The measurement model is the part of the model that examines the relationship between the latent variables and their measures.
Structural Equation Model	Structural Model and Measurement model, which includes everything that has been measured, observed or manipulated in the examined set of variables.
Recursive Structural Equation Modelling	Causation is directed in a single direction throughout the model.
Non-recursive Structural Equation Modelling	Causation flows in both directions in some parts of the model.
Multivariate Normality	While EFA techniques require that the variables used demonstrate univariate normality, that is, it is assumed that each variable conforms to the normal distribution curve (when the mean is in the centre of the distribution), confirmatory techniques require multivariate normality: that is, the sum of all the variables conforms to a normal curve.
Residual Term	The value that represents the difference between the corresponding values in the expected and observed matrices. The Root Mean Squared Error of Approximation (RMSEA) provides an indication of the amount of unexplained variance or residual. Acceptable model fit is indicated by an RMSEA value of 0.06 or less.
Path Diagram	A pictorial representation of a model.
Specification	Formulating a statement about a set of parameters and stating a model that is understood to be wrong to some degree.

Interpretable Solution	Can be taken to mean only that the model provides one plausible representation of the structure that produced the observed data.
Reflective Indicators	Indicators that are considered as effects of the Latent Variables (LVs). In other words, the LVs cause or form the indicators (Chin, 1998). All reflective indicators measure the same underlying phenomenon, namely the LV. Whenever the LV changes, all reflective indicators should change accordingly, which refers to internal consistency (Bollen, 1984). In reflective measures, changes in the construct are reflected in changes in all of its indicators, and the direction of causality is from the construct to the indicators. Reflective indictors are assessed in terms of their loadings, which entails the simple correlation between the indicator and the construct.
Formative Indicators	Indicators that cause or form the LV by definition (Chin 1998b). These indicators are viewed as the cause variables that reflect the conditions under which the LV is realized. Since there is no direct causal relationship between the LV and the indicators (but vice versa), formative indicators may even be inversely related to each other. In other words, formative indicators of the same LV do not necessarily have to correlate (Bollen, 1984; Rossiter E, 2002). In formative measures, the indicators do not reflect the underlying construct but are combined to form it without any assumptions about the intercorrelation patterns among them. The direction of causality is from the indicators to the construct and the weights of formative indicators represent the importance of each indicator in explaining the variance of the construct.

APPENDIX D: ETHICAL CLEARANCE

UNISA | college of science, engineering and technology

Dear Mr Chris Daniël Grobler (33354618)

Date: 2015-03-03

Application number:
032/CDG/2015

REQUEST FOR ETHICAL CLEARANCE: (The Development of a Strategic Model for Ensuring Business Value in Technology Driven Organisations)

The College of Science, Engineering and Technology's (CSET) Research and Ethics Committee has considered the relevant parts of the studies relating to the abovementioned research project and research methodology and is pleased to inform you that ethical clearance is granted for your research study as set out in your proposal and application for ethical clearance.

Therefore, involved parties may also consider ethics approval as granted. However, the permission granted must not be misconstrued as constituting an instruction from the CSET Executive or the CSET CRIC that sampled interviewees (if applicable) are compelled to take part in the research project. All interviewees retain their individual right to decide whether to participate or not.

We trust that the research will be undertaken in a manner that is respectful of the rights and integrity of those who volunteer to participate, as stipulated in the UNISA Research Ethics policy. The policy can be found at the following URL:
http://cm.unisa.ac.za/contents/departments/res_policies/docs/ResearchEthicsPolicy_apprvCounc_21Sept07.pdf

Please note that the ethical clearance is granted for the duration of this project and if you subsequently do a follow-up study that requires the use of a different research instrument, you will have to submit an addendum to this application, explaining the purpose of the follow-up study and attach the new instrument along with a comprehensive information document and consent form.

Yours sincerely

Prof Ernest Mnkandla
Chair: College of Science, Engineering and Technology Ethics Sub-Committee

Prof IOG Moche
Executive Dean: College of Science, Engineering and Technology

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APPENDIX E: INFORMED PERMISSION

Informed permission was subject to the following criteria:

1. Permission is hereby granted to Chris Daniël Grobler (currently an employee of the organisation) to conduct research within the organisation as part of his doctoral studies through the University of South Africa.
2. The research will comprise of structured (1) interviews with particular organisational staff members as well as the completion of (2) questionnaires and (3) rating & agreement scales by specific staff member groups.
3. It is understood that all interaction with organisational staff members will be subject to the stipulations in the attached Informed Consent form. Refer to Appendix F.
4. All questions included in the aforementioned instruments, will be reviewed by me before exposing organisational staff members to same.
5. The results from the research instruments will be made available to me for review before being published.

The following statement was posted at the top of page one of every interview pack, questionnaire and rating & agreement scale:

1. Feedback provided by respondents to this questionnaire is intended solely for the purposes of academic research. At no time will the researcher attempt to link feedback from participants to any particular individual. Moreover, feedback that is considered as particularly sensitive or controversial will be naturalised within the broader context of the research findings to limit the ability of any individual, other than the researcher and his study leader, to retrace a response trail back to a specific participant in a group. The foregoing implies that a particular reported response will only be traced back to a referent group in as far as it was gleaned from within the specific group and not a particular individual. Respondents are free to decline the answering of any particular questions if they do not feel comfortable to respond to these.
2. Kindly click in the box below to indicate your consent for the use of your feedback as specified above.

APPENDIX F: INFORMED CONSENT

Informed Consent (To be signed by research participants)
PhD Research Topic: The Development of a Strategic Model for Ensuring Business Value in Technology Driven Organisations

The salient **ethical concern** in this study is that of participant anonymity, especially in cases where feedback from participants could discredit, incriminate or limit potential career advancement prospects of individuals or produce a reputational or strategic risk for the organisation.

Feedback provided by respondents to questions is intended solely for the purposes of academic research. At no time will the research paper link feedback from participants to any particular individual. Moreover, feedback that is considered as particularly sensitive or controversial will be naturalised (de-identified) within the broader context of the research findings to limit the ability of any individual, other than the researcher and his study leader, to retrace a response trail back to a specific participant in a group.

The foregoing implies that measures will be taken to ensure that all reported/ published responses can only be traced back to a referent group* in as far as it was gleaned from within the specific group and not a particular individual. Respondents are free to decline the answering of any particular questions if they do not feel comfortable to respond to these. If a respondent is not comfortable with the questioning process s/he may terminate their participation at any point in time and request that their responses not be included as part of the research.

Kindly take note that all interviews will be digitally recorded and electronically transcribed and subsequently coded for academic research purposes. All paper copies will be digitised (scanned in) and stored with electronic information on an encrypted device. Any and all feedback will be protected and held in the strictest confidence so as not to identify and, in so doing, associate any particular person with a particular discussion.

I ………………………………………………………………………………………… hereby confirm that the aim of this research has been adequately explained to me and subsequently provide my consent to contribute as a participant in the interview/ questionnaire process and that my responses may be used for academic research purposes as indicated in the preceding paragraphs.

Signature **Date**

*** Group**

Executive	
Manager	
Specialist	
IS end-user	

I agree to being contacted again by the researcher if my responses give rise to interesting findings or cross references.

Y	N

Consent taken by: CD Grobler **Signature**

Researcher: **Mr CD Grobler**
Cell: 083 415 7549
Email: eposrekening@gmail.com
Institution: UNISA
Supervisor: **Prof TM van der Merwe**
Cell: 011 471 3863
Email: vdmertm@unisa.ac.za

APPENDIX G: INTERVIEW QUESTIONS FOR DISCUSSION

PhD Research Topic: The Development of a Strategic Model for Ensuring Business Value in Technology Driven Organisations

Notes:

1. Kindly refer to the '***Research Information Letter***' for additional background on the research topic.
2. Please also ensure that you complete and sign the '***Informed Consent***' form before participating in the research.

Four value dissipating end-user behaviours:

i. Unintentional misuse of IS.
ii. Passive disuse of IS.
iii. Active abuse of IS.
iv. Intentional sabotage of IS.

Questions:

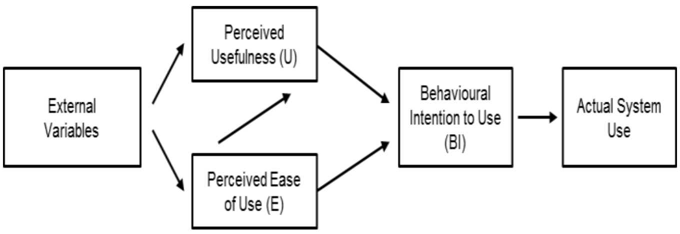
1. Do you agree that the introduction of an IS may not only create value for an organisation but may also inadvertently dissipate value? Why, why not?
2. Do you think the four behaviours are valid value dissipating drivers in an organisation?
3. Which of the following end-user attributes have the greatest influence on each of the four behaviours; Employees' **beliefs**, **attitudes**, and **intentions**?
4. Rank the above four behaviours from the behaviour that has the most potential to dissipate value to the one that has the least potential to dissipate value. Please motivate your ranking.
5. How do you think the four behaviours influence, cause, reinforce or moderate each other?
6. How can the value eroding impact caused by end-users in your organisation be minimised?
    - Consider the establishment of **control measures** to minimise the four **behaviours**.
    - Consider the institution of **value leadership** to **influence** end-user's **beliefs**, **attitudes**, and **intentions** towards the use of IS.

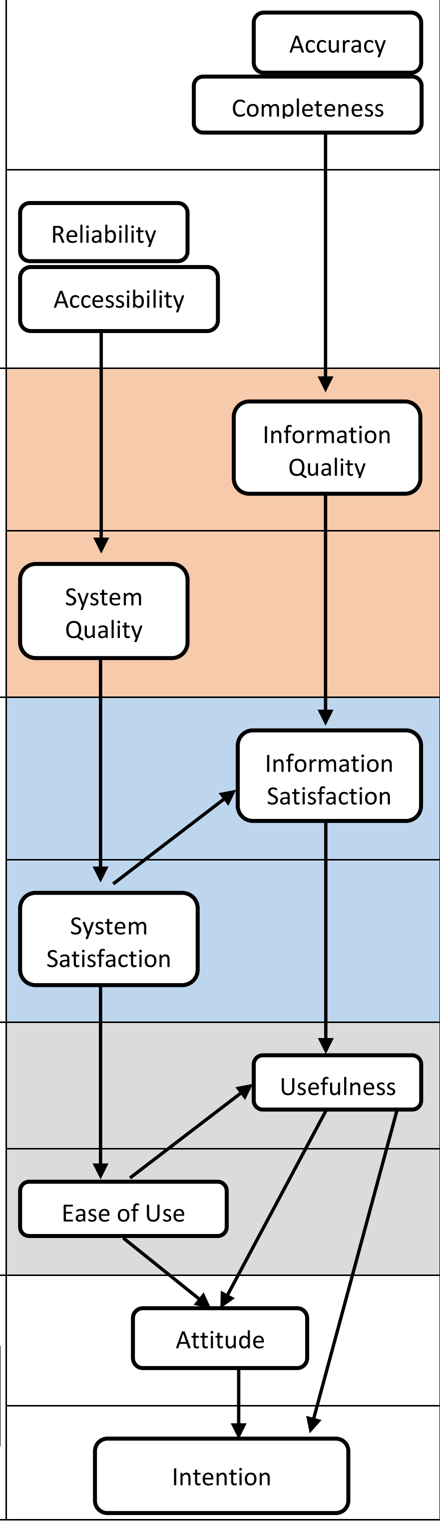
APPENDIX H: CONTEXT TO INTERVIEW QUESTIONS

Provided to participants prior to interview process

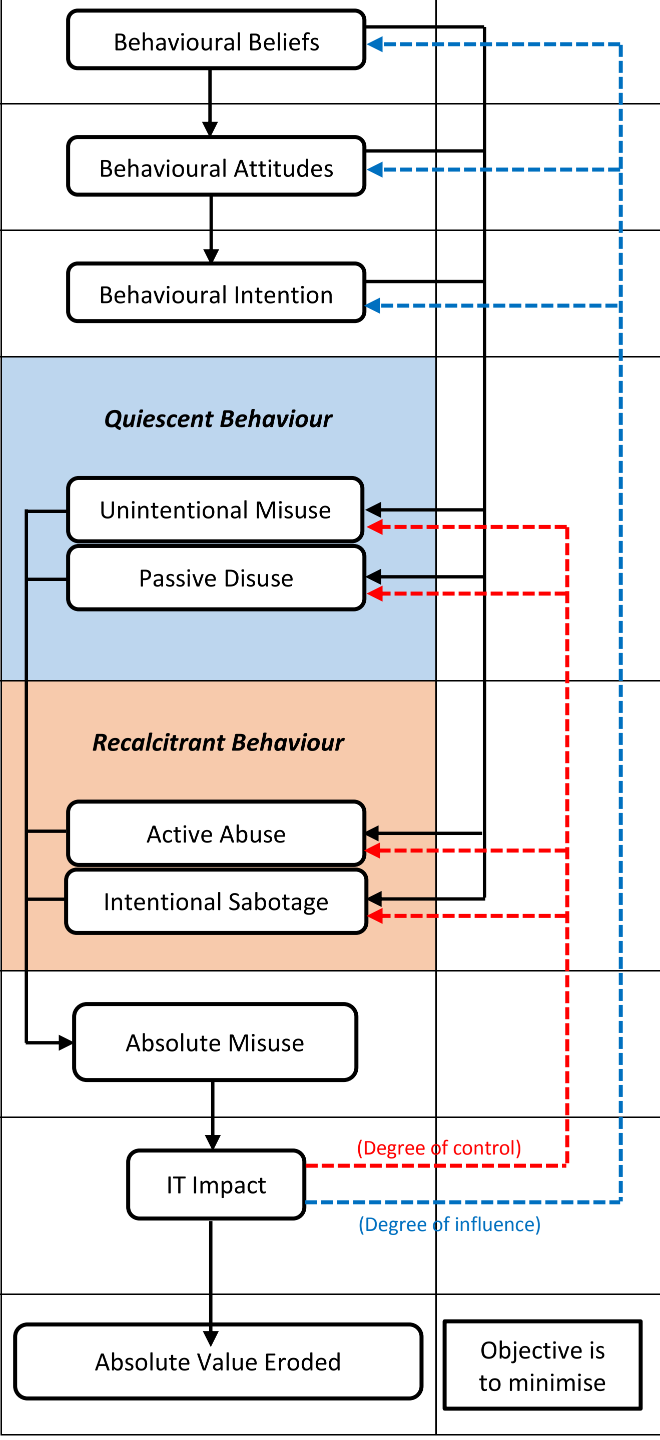
Wixom & Todd proposed to breach the satisfaction-usage gap by constructing a theoretical bridge from IS design and implementation decisions to system characteristics to the prediction of usage. They identified user-satisfaction and technology acceptance as the key themes that drive understanding of IT usage and subsequently proposed the integration of these research streams in an effort to augment understanding of the manner in which an IS's features ultimately affect system usage. The model makes explicit the distinction between beliefs and attitudes, found in respectively the user satisfaction (object-based) and technology acceptance (behavioural) literature.

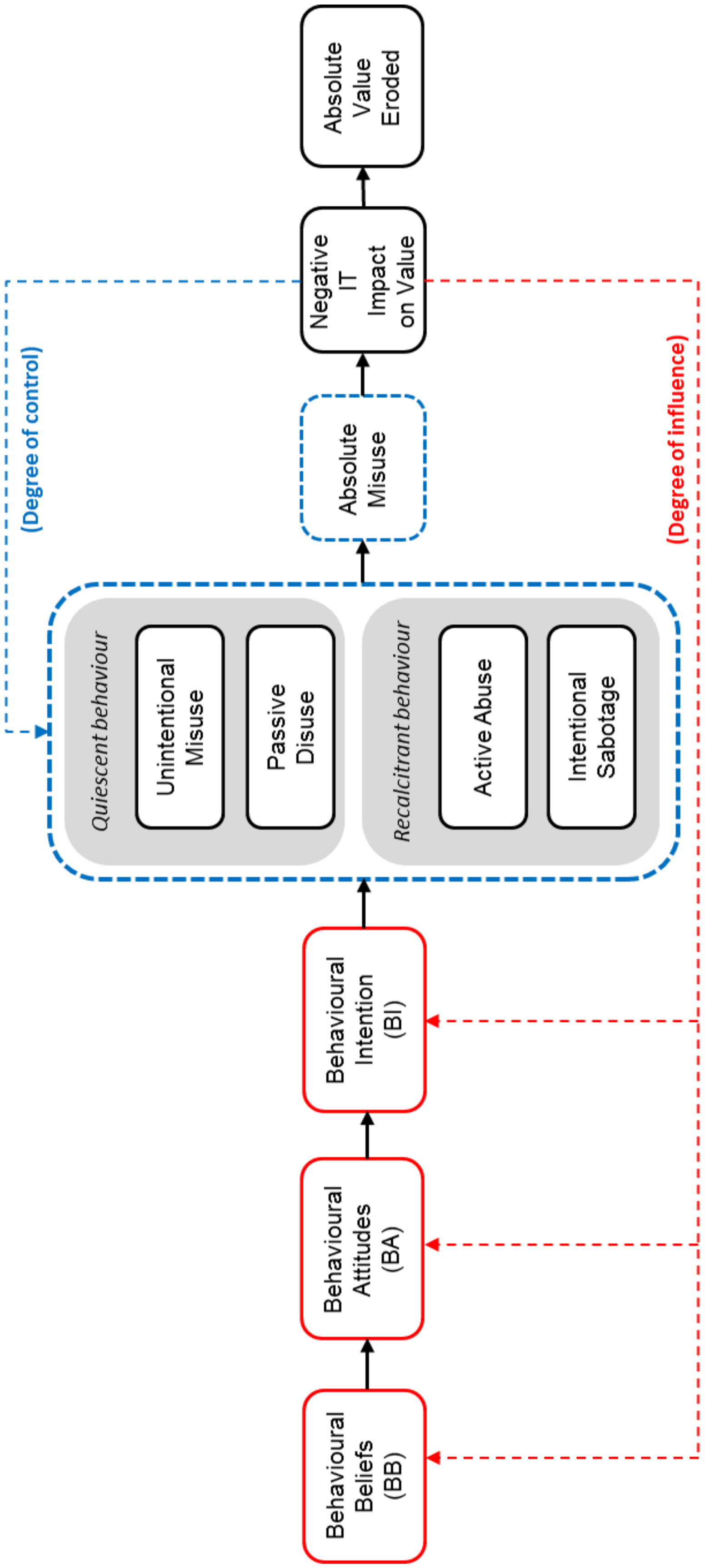
1 2	The model enumerates a set of information and system characteristics that are purported to respectively influence information quality (accuracy & completeness) and system quality (reliability & accessibility).	
3 4	Continuing, the information and system characteristics in turn influence object-based beliefs and attitudes, with the information and the system that produces it.	Object-based Beliefs
5 6	Finally, the model describes the influence that object-based attitudes have in the shaping of behavioural beliefs of usefulness and ease of use, and ultimately system usage. The literature on user satisfaction has focused on the elements of information and system characteristics. Since user satisfaction is viewed within the literature as the attitude that a user has toward an IS, it can be said to represent an object-based attitude. Moreover system satisfaction has a direct influence on information satisfaction since a user's effective interaction with a system is a necessary condition for obtaining useful information from it.	Object-based Attitudes
7 8	Research shows a strong significant relationship between respectively information satisfaction and usefulness, and between system satisfaction and ease of use. The results support the applicability of information and system satisfaction as external variables to the Technology Acceptance Model's beliefs of usage behaviour.	Behavioural Beliefs
9 10		Behavioural Attitude





	Technology Acceptance Model
11	Refer to lines 7 & 8 above.
12	Refer to line 9 above.
13	Refer to line 10 above.
14	Unintentional misuse and passive disuse are both assumed to possess quiescent qualities. The unintentional misuse construct denotes actual behaviour where the user is misapplying the system, either consciously or unconsciously, due to a lack of skill or negligence. User skill is a critical IT asset without which the value of the IT portfolio cannot be realised. In contrast, passive disuse can be described as a user's passive-aggressive attitude towards having to use a particular system, causing the user to avoid interaction with the system. Since behavioural intention informs actual behaviour, unintentional misuse due to logical errors in system codes are not considered here.
15	The two recalcitrant behaviour constructs describe a more sinister scenario. Employees cannot simply be taken to be quiescent contributors to the achievement of organisational goals. A rich model has to leave room for actors who, while demonstrating subversive behaviour, still remain true members of the organisation. Active abuse encompasses situations where a user determinedly employs the system for personal gain or to perform unauthorised transactions. Finally, intentional sabotage designates the purposeful disruption or damage to a system by a disgruntled user.
16	The outcomes of each of the actual behaviour constructs is summated into the absolute misuse determinate which is a precursor to IT impact.
17	IT impact mediates between absolute misuse and absolute value eroded as it attempts to moderate undesirable actual behaviour through system control and human influence. The final construct of absolute value eroded defines the residual value eroded, after particular measures had been taken to reduce the value erosive effect caused by system users.
18	When considering feedback loops (denoted by dotted lines) it is well to note that changes in each variable to some extent causes changes in the other variables. Moreover, researchers identify two forms of feedback that need to be incorporated when constructing a model, namely negative feedback with balancing loops, leading to stability; and positive or reinforcing feedback with amplifying loops, that lead to continual growth or decay. Within the conceptual framework, two feedback loops are proposed, namely degree of control and degree of influence. The degree of control loop attempts to (through logical system controls and management interposition) control both quiescent and recalcitrant user behaviour during system usage, while the degree of influence loop endeavours to (through value leadership) influence user belief, attitude, and intention, towards correct and optimal system use.





Conceptual Technology Value Framework

1 Behavioural Beliefs

Usefulness		
	Information Satisfaction (Information Quality)	
	(Accuracy)	(Completeness)
	System Satisfaction	
Ease of Use		
	System Satisfaction (System Quality)	
	(Reliability)	(Accessibility)

2 Behavioural Attitude & Intention

	Positive
	Neutral
	Negative

3 Actual Behaviour

Quiescent behaviour	Unintentional Misuse
	Passive Disuse
Recalcitrant behaviour	Active Abuse
	Intentional Sabotage

4 Absolute Misuse

Quiescent behaviour	Outcome of Unintentional Misuse
	Outcome of Passive Disuse
Recalcitrant behaviour	Outcome of Active Abuse
	Outcome of Intentional Sabotage

5 IT Impact

Aggregate	Value trend is Positive	+10% to +100%
	Value trend is Neutral	0
	Value trend is Negative	-10% to -100%

6 Moderation of Behaviour

System	Instituted degree of control	High Medium Low
User	Instituted degree of influence	High Medium Low

APPENDIX I: DETAILS OF 31 INTERVIEW PARTICIPANTS

Participant No.	Position	Date	Gender	Stakeholder
Interviewee 01	Divisional Executive	2015/03/09	M	Decision maker
Interviewee 02	Executive Head	2015/03/13	M	Witness
Interviewee 03	Programme Executive	2015/03/13	M	Decision maker
Interviewee 04	Senior Manager Forensics	2015/03/18	F	Witness
Interviewee 05	Divisional Technology Officer	2015/03/18	M	Beneficiary
Interviewee 06	Divisional Executive	2015/03/23	M	Decision maker
Interviewee 07	Delivery Manager	2015/03/25	M	Expert
Interviewee 08	Forensics Specialist	2015/03/26	M	Witness
Interviewee 09	Senior Technical Consultant	2015/03/26	M	Expert
Interviewee 10	Delivery Manager	2015/03/30	M	Expert
Interviewee 11	Solutions Architect	2015/03/30	M	Witness
Interviewee 12	IT Risk Specialist	2015/03/30	M	Witness
Interviewee 13	HR Specialist	2015/03/31	M	Witness
Interviewee 14	Disaster Recovery Specialist	2015/04/01	M	Witness
Interviewee 15	General Manager	2015/04/02	F	Decision maker
Interviewee 16	Executive Head	2015/04/02	M	Witness
Interviewee 17	Programme Executive	2015/04/07	M	Decision maker
Interviewee 18	Executive Head	2015/04/08	F	Decision maker
Interviewee 19	Executive Head	2015/04/08	M	Beneficiary
Interviewee 20	Process Specialist	2015/04/08	M	Expert
Interviewee 21	Divisional Technology Officer	2015/04/09	M	Beneficiary
Interviewee 22	Divisional Executive	2015/04/10	M	Witness
Interviewee 23	Divisional Technology Officer	2015/04/10	M	Decision maker
Interviewee 24	Executive Head	2015/04/13	M	Expert
Interviewee 25	Process Specialist	2015/04/15	M	Expert
Interviewee 26	IT Security Specialist	2015/04/17	M	Expert
Interviewee 27	Executive Head	2015/04/20	M	Decision maker
Interviewee 28	Executive Head	2015/04/22	M	Expert
Interviewee 29	IT Risk Specialist	2015/04/24	M	Witness
Interviewee 30	Executive Head	2015/04/24	M	Decision maker
Interviewee 31	Executive Head	2015/04/24	F	Beneficiary

APPENDIX J: SURVEY QUESTIONNAIRE

Landing Page of Questionnaire

Information Technology Usage

Kindly complete the short doctoral research survey below and stand a chance to win R1,000!

The questionnaire will take you approximately 20 to 30 minutes to complete.**Kindly note that all questions are mandatory.**

Informed Consent

* **1. By ticking this box I agree that my feedback may be statistically analysed for academic research purposes. I understand that my feedback will remain anonymous and that it will at no time be linked back to me. Moreover I confirm that my participation and feedback is voluntary.**

Kindly refer to Terms & Conditions section in the original email.

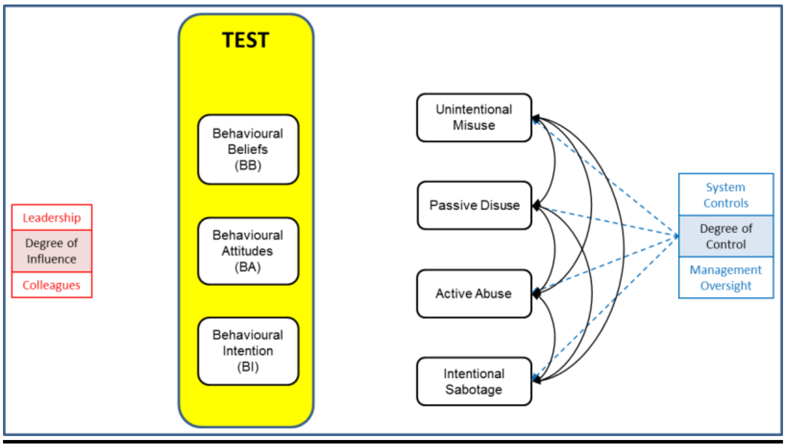
◯ Yes

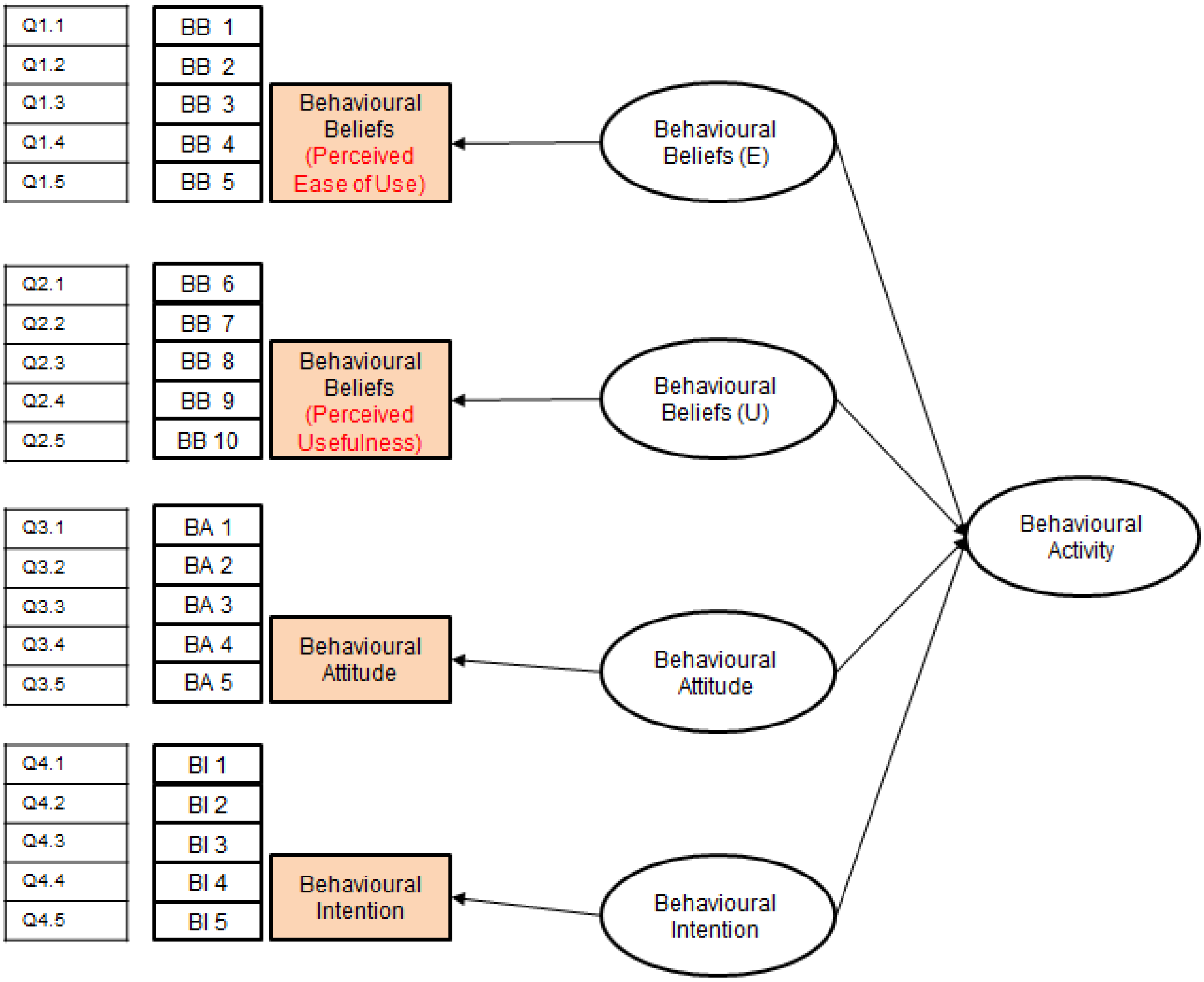
A. Demographical information

Section A: Demographical information								
1	Please state your gender.	**Male**	**Female**					
2	Where do you reside?	**Head Office**	**Regional Office**	**Local Branch Network**	**Other**			
3	Please state your ethnicity.	**Asian**	**Black**	**Coloured**	**Indian**	**White**		
4	In which business cluster do you reside?	**BSM**	**CIB**	**EGC**	**Finance**	**GMCCA**		
		GT	**HR**	**RBB**	**Risk**	**RoA**	**Wealth**	
5	Please state you age. (Years)	**< 20**	**20 - 29**	**30 - 39**	**40 - 49**	**50 - 59**	**> 59**	
6	How long have you been with the organisation? (Years)	**< 5**	**5 - 9**	**10 -14**	**15 - 19**	**20 - 24**	**> 24**	
7	Please state your level of seniority in the organisation.	**Non-Management**	**Junior Management**	**Middle Management**	**Technical Specialist**	**Senior Management**	**Executive Management**	
8	How would you rank your personal proficiency in the use of the organisation's computer systems related to yor function?	**Extremely Low**	**Low**	**Medium Low**	**Medium**	**Medium High**	**High**	**Very High**

Section	No of Quest.
A	8
B	20
C	20
D	12
E	12
F	12
G	12
H	12
Total	108

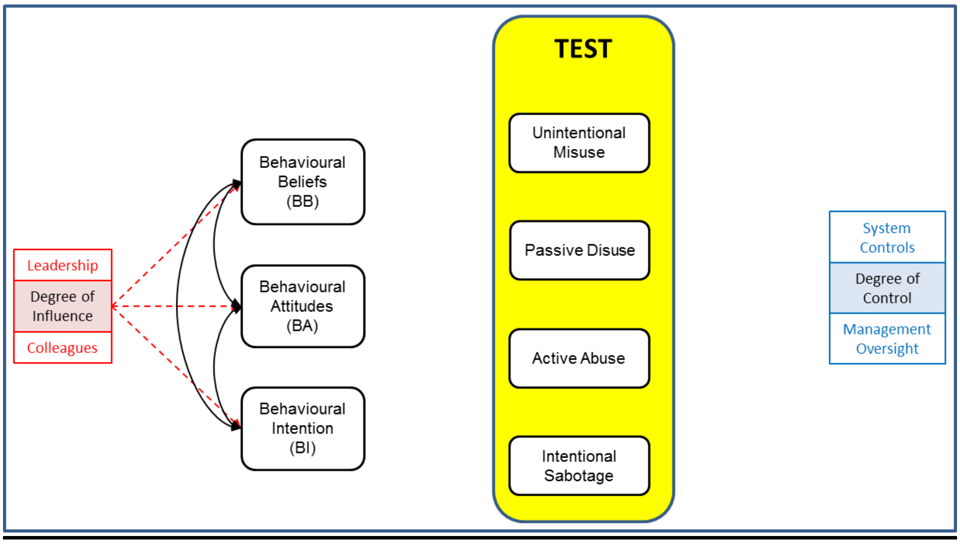
B. Test Validity of Three Behavioural Constructs

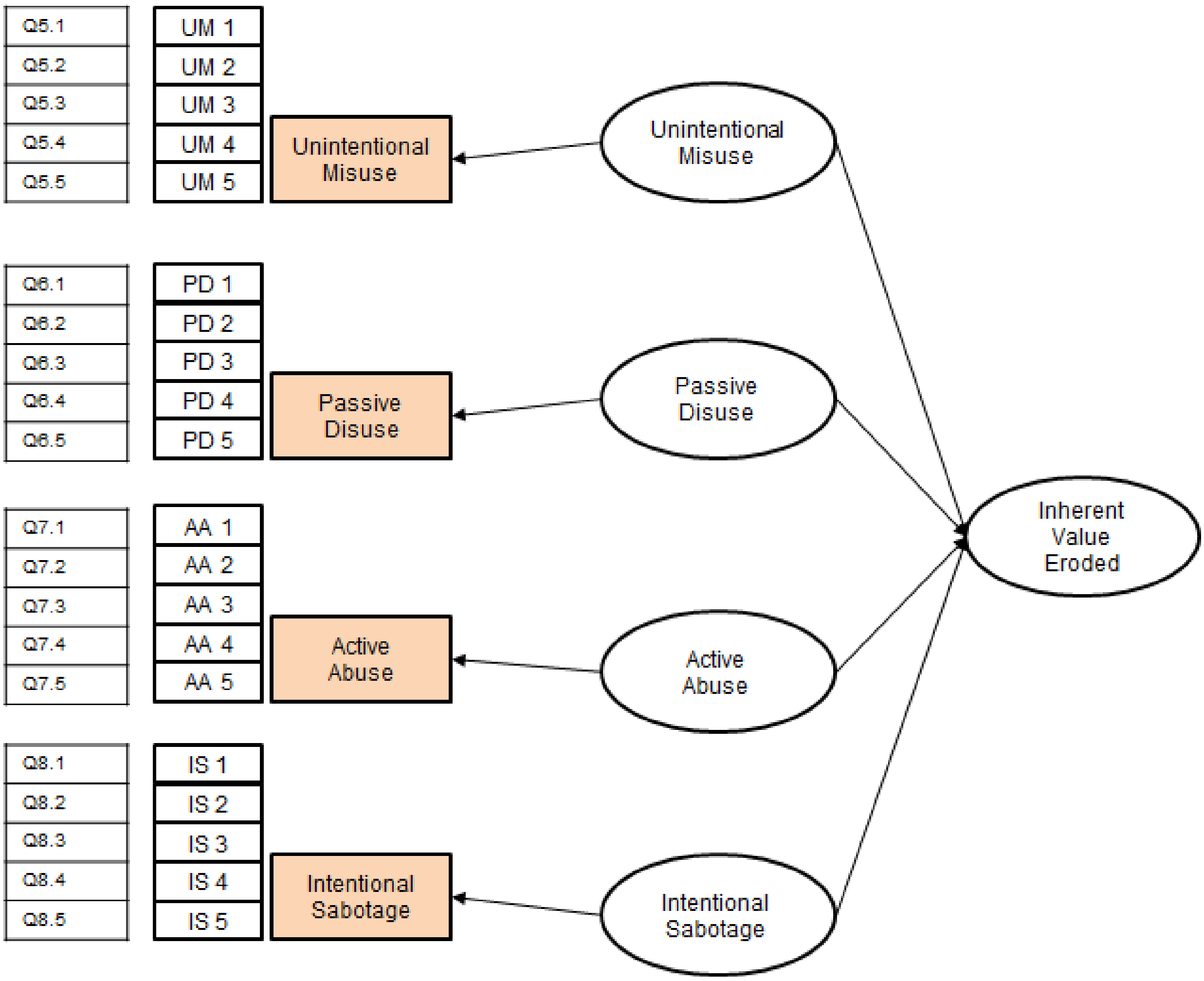




Section B: Employees' beliefs, attitudes and intentions									
Please indicate your agreement with the following statements: Consider your situation when making use of computer systems in your organisation.		**Completely Disagree**	**Disagree**	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Completely Agree**	**Testing**
Q1.1	The computer systems of the organisation are simple to navigate.								Behavioural Beliefs (Perceived Ease of Use)
Q1.2	The computer systems of the organisation are easy to use.								Behavioural Beliefs (Perceived Ease of Use)
Q1.3	The computer systems of the organisation are not difficult to use.								Behavioural Beliefs (Perceived Ease of Use)
Q1.4	The computer systems of the organisation reduce my work stress.								Behavioural Beliefs (Perceived Ease of Use)
Q1.5	The computer systems of the organisation are easy to understand.								Behavioural Beliefs (Perceived Ease of Use)
Q2.1	The computer systems of the organisation are aligned to my work requirements.								Behavioural Beliefs (Perceived Usefulness)
Q2.2	The computer systems of the organisation enable me to perform my work faster.								Behavioural Beliefs (Perceived Usefulness)
Q2.3	The computer systems of the organisation ensures that I can do my work more accurately.								Behavioural Beliefs (Perceived Usefulness)
Q2.4	The computer systems of the organisation results in better quality work being produced by me.								Behavioural Beliefs (Perceived Usefulness)
Q2.5	The computer systems of the organisation enable me to do my work more effectively.								Behavioural Beliefs (Perceived Usefulness)
Q3.1	When making use of computer systems, I feel positive.								Behavioural Attitude
Q3.2	When making use of computer systems, my state of mind is positively influenced.								Behavioural Attitude
Q3.3	Requiring employees to make use of computer systems is a good idea.								Behavioural Attitude
Q3.4	When making use of computer systems, I find it to be a pleasant experience.								Behavioural Attitude
Q3.5	When making use of computer systems, I am thankful for having the use of a computer to enhance my work experience.								Behavioural Attitude
Q4.1	I plan to make use of all relevant computer systems.								Behavioural Intention
Q4.2	I plan to utilise computer systems to do my work.								Behavioural Intention
Q4.3	I will make use of prescribed computer systems.								Behavioural Intention
Q4.4	I will use computer systems to perform my work tasks.								Behavioural Intention
Q4.5	I will choose to employ computer systems to help me with my work.								Behavioural Intention

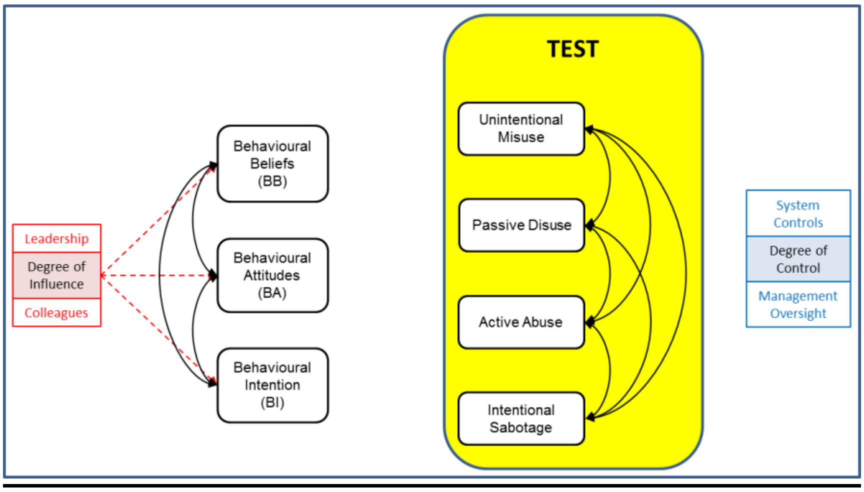
C. Test Validity of Four Activity/Action Constructs

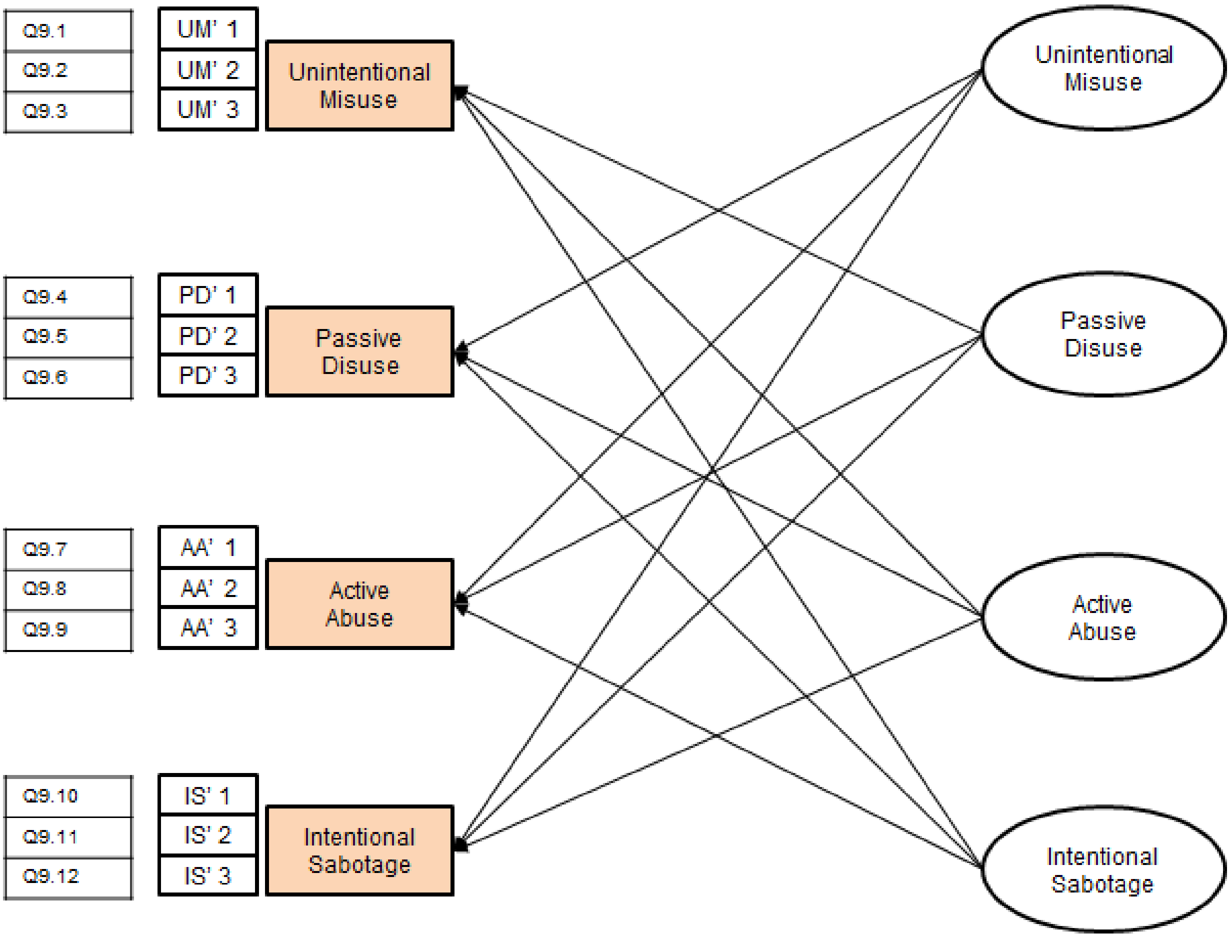




Section C: Employees' usage of computer systems									
Please indicate your agreement with the following statements: Consider the behaviour of employees who make use of computers systems in your organisation.		**Completely Disagree**	**Disagree**	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Completely Agree**	**Testing**
Q5.1	I sometimes make mistakes while using computer systems without realising it.								Unintentional Misuse
Q5.2	I sometimes make errors when using computer systems, and do not know how to correct my mistakes without assistance.								Unintentional Misuse
Q5.3	I work at a slow pace because I am forced to make use of particular computer systems which I do not like.								Unintentional Misuse
Q5.4	I am instructed to make use of a computer system which I do not properly understand.								Unintentional Misuse
Q5.5	I sometimes have to redo work on certain computer systems because I accidentally made mistakes the first time around.								Unintentional Misuse
Q6.1	I do not always make use of computer systems that I am instructed to use.								Passive Disuse
Q6.2	I make use of alternative (preferred) computer systems, rather than the prescribed computer systems.								Passive Disuse
Q6.3	I prefer to make use of computer systems because they are easy to use and not because they are prescribed by management.								Passive Disuse
Q6.4	I complete my work on more than one computer system because I do not know how to complete some processes start-to-end on the prescribed computer system.								Passive Disuse
Q6.5	I make use of the computer system on which I can perform my work the fastest and not necessarily the one which I am forced to make use of.								Passive Disuse
Q7.1	Employees make use of the organisation's computer systems for personal gain.								Active Abuse
Q7.2	Employees abuse the organisation's computer systems for their own benefit.								Active Abuse
Q7.3	Employees take advantage of the organisation's computer systems to enrich themselves.								Active Abuse
Q7.4	Employees conduct personal business on the organisation's computer systems.								Active Abuse
Q7.5	Employees make use of the organisation's computer systems to access, view, and even sell personal employee or client information to third parties.								Active Abuse
Q8.1	Employees collude with third parties to sabotage the organisation's computer systems.								Intentional Sabotage
Q8.2	Employees intentionally disrupt the operations of the organisation's computer systems.								Intentional Sabotage
Q8.3	Employees deliberately damage the organisation's computer systems.								Intentional Sabotage
Q8.4	Employees purposely break a particular computer system so that they will be forced to make use of another computer system that they prefer to use.								Intentional Sabotage
Q8.5	Employees become disgruntled and then intentionally cause damage to the organisation's computer systems.								Intentional Sabotage

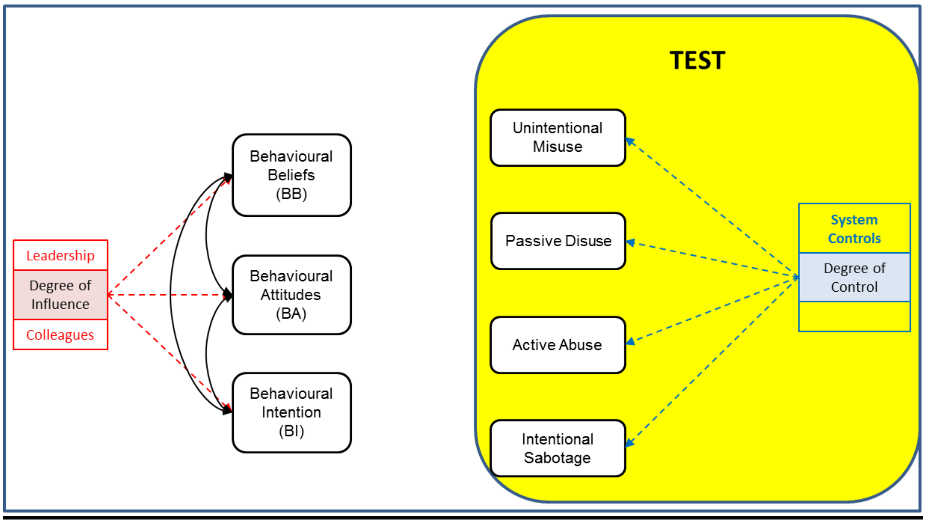
D. Causal Effects of Four Activity/Action Constructs on Each Other

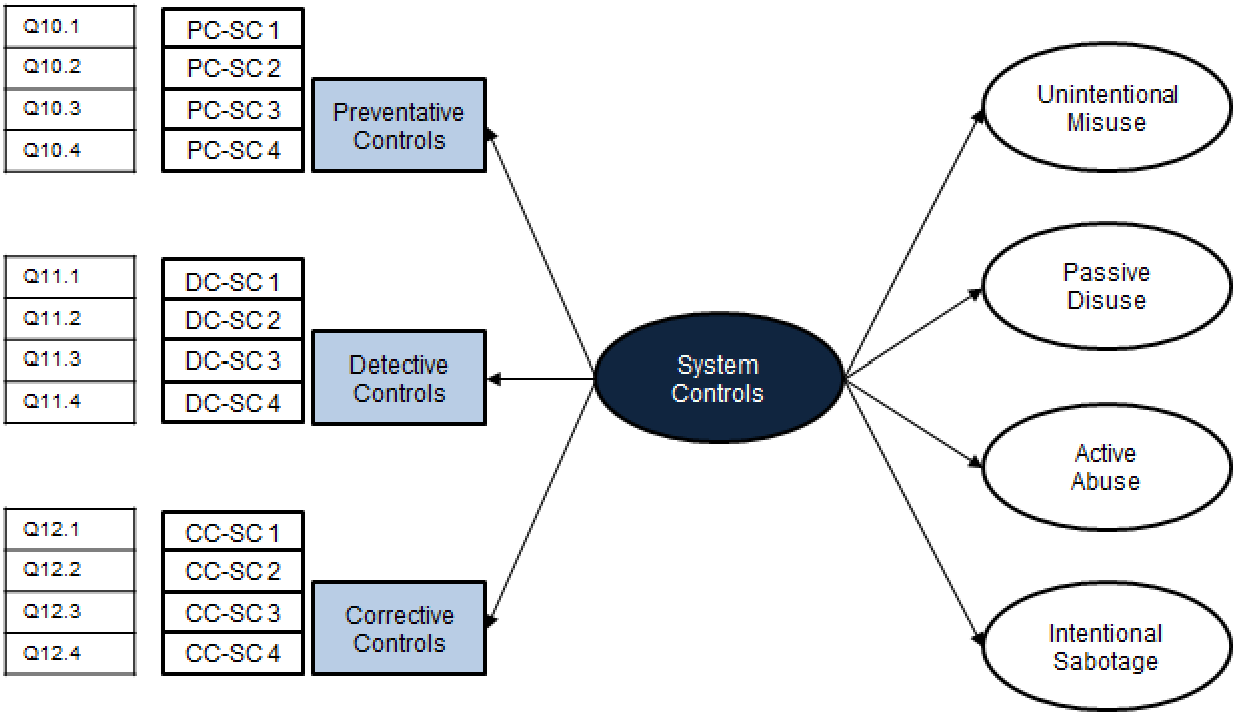




Section D: Resultant effects of unsatisfactory computer usage									
Please indicate your agreement with the following statements: Consider the behaviour of employees who make use of computers systems in your organisation.		**Completely Disagree**	**Disagree**	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Completely Agree**	**Testing**
Q9.1	Employees who unintentionally make mistakes while using a particular computer system will later on avoid having to use the computer system.								Unintentional Misuse leading to Passive Disuse
Q9.2	Employees who unintentionally make mistakes while using a particular computer system will later on actively abuse the computer system for personal gain.								Unintentional Misuse leading to Active Abuse
Q9.3	Employees who unintentionally make mistakes while using a particular computer system will later on attempt to intentionally break the computer system.								Unintentional Misuse leading to Intentional Sabotage
Q9.4	Employees who avoid having to make use of a particular computer system will later on unintentionally make mistakes when actually using the computer system.								Passive Disuse leading to Unintentional Misuse
Q9.5	Employees who avoid having to make use of a particular computer system will later on attempt to actively abuse the computer system for personal gain.								Passive Disuse leading to Active Abuse
Q9.6	Employees who avoid having to make use of a particular computer system will later on attempt to intentionally break the computer system.								Passive Disuse leading to Intentional Sabotage
Q9.7	Employees who actively abuse a particular computer system for personal gain will later on unintentionally make mistakes when actually using the computer system.								Active Abuse leading to Unintentional Misuse
Q9.8	Employees who actively abuse a particular computer system for personal gain will later on avoid having to use the computer system.								Active Abuse leading to Passive Disuse
Q9.9	Employees who actively abuse a particular computer system for personal gain will later on attempt to intentionally break the computer system.								Active Abuse leading to Intentional Sabotage
Q9.10	Employees who attempt to intentionally break a particular computer system will later on unintentionally make mistakes when actually using the computer system.								Intentional Sabotage leading to Unintentional Misuse
Q9.11	Employees who attempt to intentionally break a particular computer system will later on avoid having to use the computer system.								Intentional Sabotage leading to Passive Disuse
Q9.12	Employees who attempt to intentionally break a particular computer system will later on attempt to actively abuse the computer system for personal gain.								Intentional Sabotage leading to Active Abuse

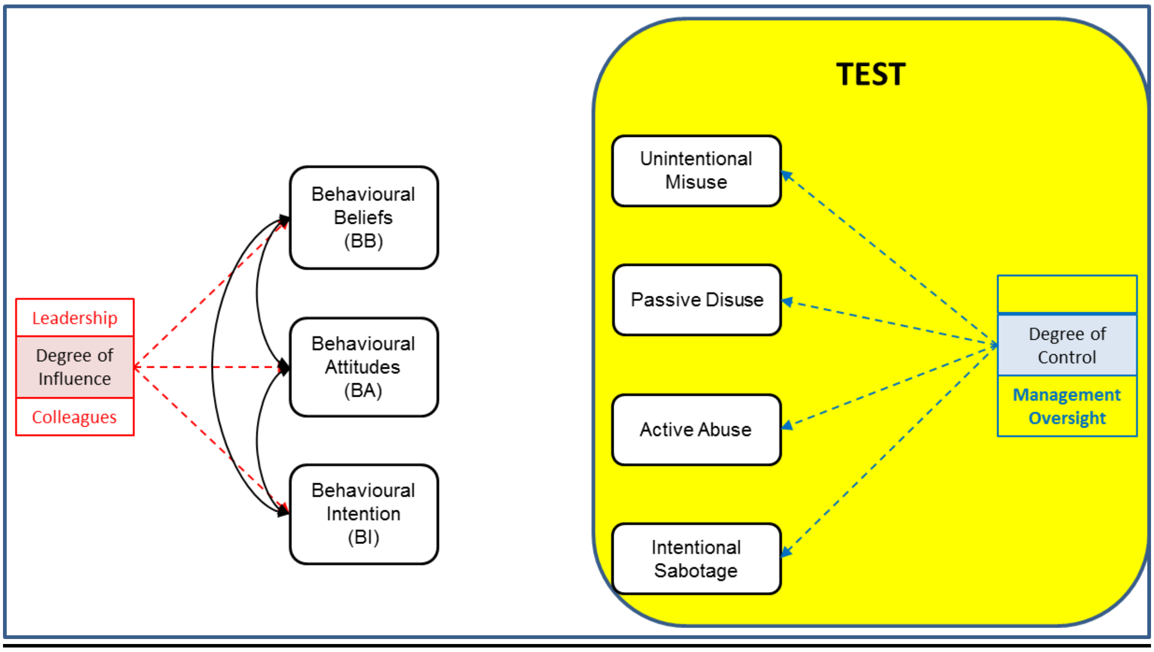
E. Mediating Effect of System Controls on Four Activity/Action Constructs

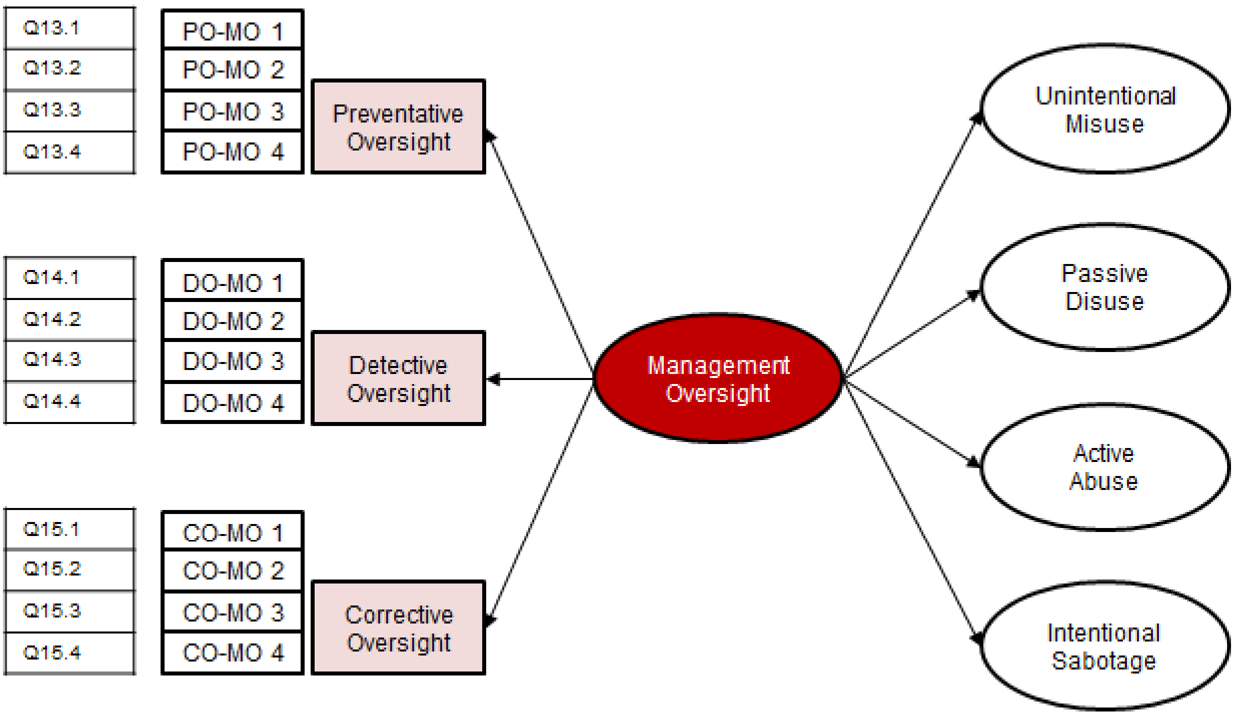




Section E: The effect of system controls in ensuring correct computer usage										
System Controls (Preventative)			**Very Ineffective**	**Ineffective**	**Somewhat Ineffective**	**Neutral**	**Somewhat Effective**	**Effective**	**Very Effective**
Q10.1	How effective do you think the introduction of computer/system controls are to **PREVENT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q10.2		Users making use of **in**correct computer systems when doing work.							
Q10.3		Users abusing computer systems for their personal benefit.							
Q10.4		Users intentionally sabotaging computer systems.							
System Controls (Detective)									
Q11.1	How effective do you think the introduction of computer/system controls are to **DETECT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q11.2		Users making use of **in**correct computer systems when doing work.							
Q11.3		Users abusing computer systems for their personal benefit.							
Q11.4		Users intentionally sabotaging computer systems.							
System Controls (Corrective)									
Q12.1	How effective do you think the introduction of computer/system controls are to **CORRECT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q12.2		Users making use of **in**correct computer systems when doing work.							
Q12.3		Users abusing computer systems for their personal benefit.							
Q12.4		Users intentionally sabotaging computer systems.							

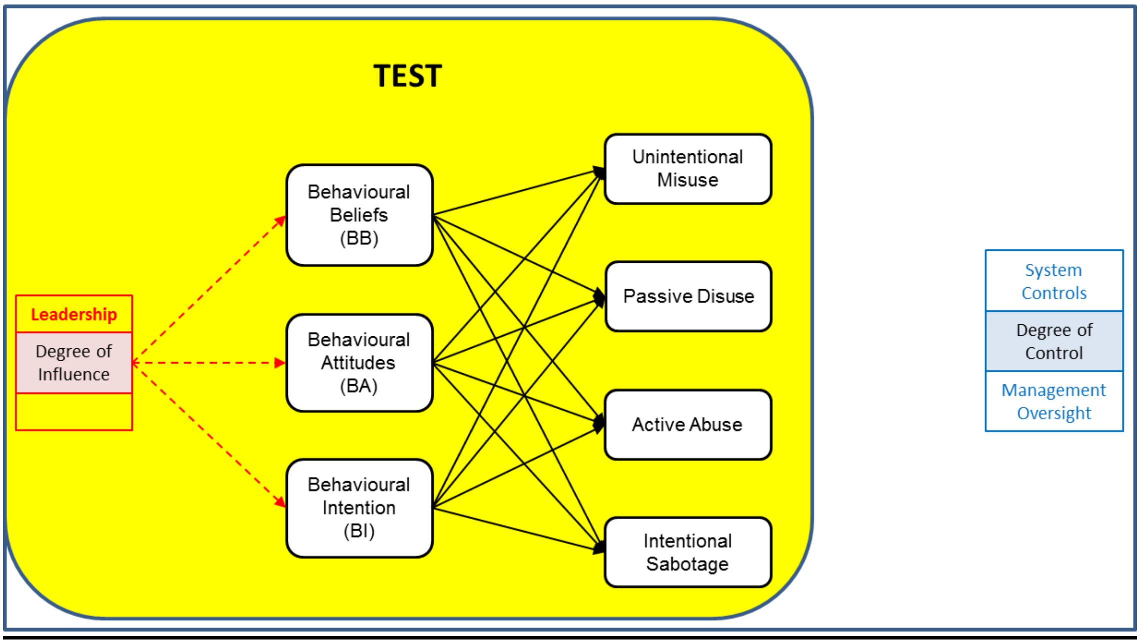
F. Mediating Effect of Management Oversight on Four Activity/Action Constructs

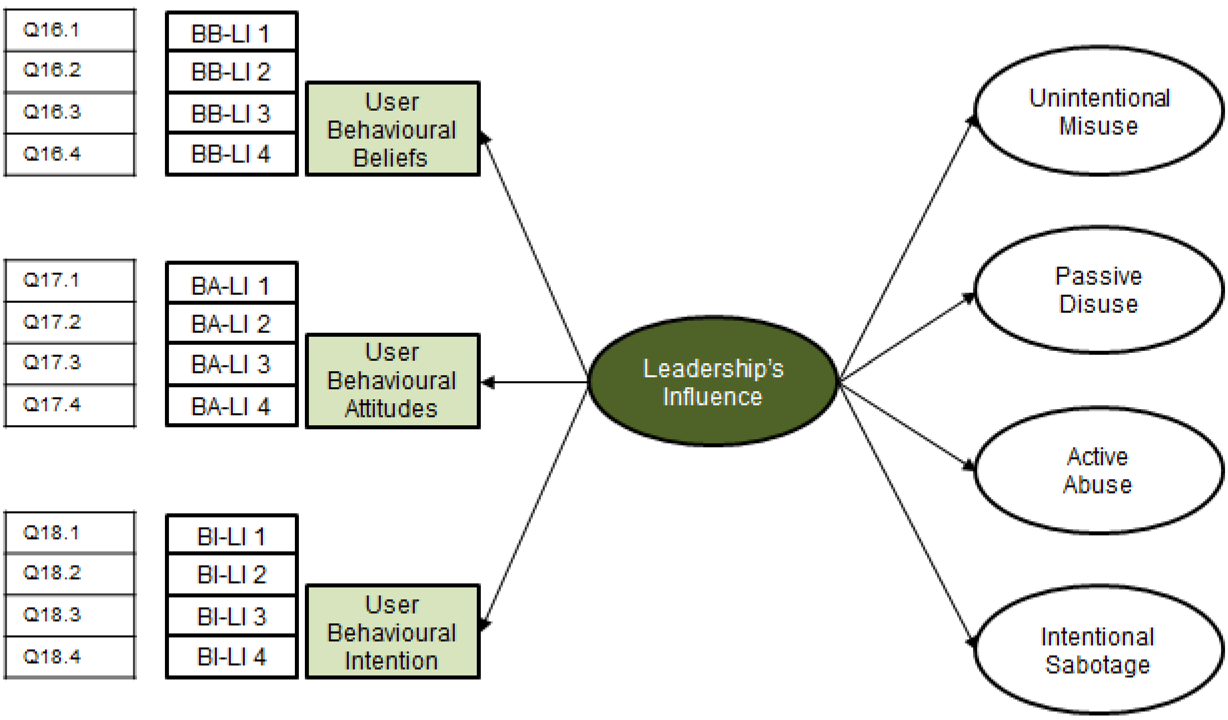




Section F: The effect of management oversight in ensuring correct computer usage									
Management Oversight (Preventative)			**Very Ineffective**	**Ineffective**	**Somewhat Ineffective**	**Neutral**	**Somewhat Effective**	**Effective**	**Very Effective**
Q13.1	How effective do you think the introduction of management oversight is to **PREVENT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q13.2		Users making use of **in**correct computer systems when doing work.							
Q13.3		Users abusing computer systems for their personal benefit.							
Q13.4		Users intentionally sabotaging computer systems.							
Management Oversight (Detective)									
Q14.1	How effective do you think the introduction of management oversight is to **DETECT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q14.2		Users making use of **in**correct computer systems when doing work.							
Q14.3		Users abusing computer systems for their personal benefit.							
Q14.4		Users intentionally sabotaging computer systems.							
Management Oversight (Corrective)									
Q15.1	How effective do you think the introduction of management oversight is to **CORRECT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q15.2		Users making use of **in**correct computer systems when doing work.							
Q15.3		Users abusing computer systems for their personal benefit.							
Q15.4		Users intentionally sabotaging computer systems.							

G. Mediating Effect of Leadership's Influence on Three Behavioural Constructs





Section G: The influence of leadership in ensuring correct computer usage									
Leadership (Beliefs)			Very Ineffective	Ineffective	Somewhat Ineffective	Neutral	Somewhat Effective	Effective	Very Effective
Q16.1	How effective do you think the influence of your organisation's leaders is to instil positive **BELIEFS** within employees to not engage in the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q16.2		Users making use of **in**correct computer systems when doing work.							
Q16.3		Users abusing computer systems for their personal benefit.							
Q16.4		Users intentionally sabotaging computer systems.							
Leadership (Attitudes)									
Q17.1	How effective do you think the influence of your organisation's leaders is to instil positive **ATTITUDES** within employees to not engage in the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q17.2		Users making use of **in**correct computer systems when doing work.							
Q17.3		Users abusing computer systems for their personal benefit.							
Q17.4		Users intentionally sabotaging computer systems.							
Leadership (Intention)									
Q18.1	How effective do you think the influence of your organisation's leaders is to instil positive **INTENTIONS** within employees to not engage in the following behaviours?	Users **un**intentionally making mistakes when using computer systems.							
Q18.2		Users making use of **in**correct computer systems when doing work.							
Q18.3		Users abusing computer systems for their personal benefit.							
Q18.4		Users intentionally sabotaging computer systems.							

Closing Page of Questionnaire

Information Technology Usage

Acknowledgement

25. Dear Colleague

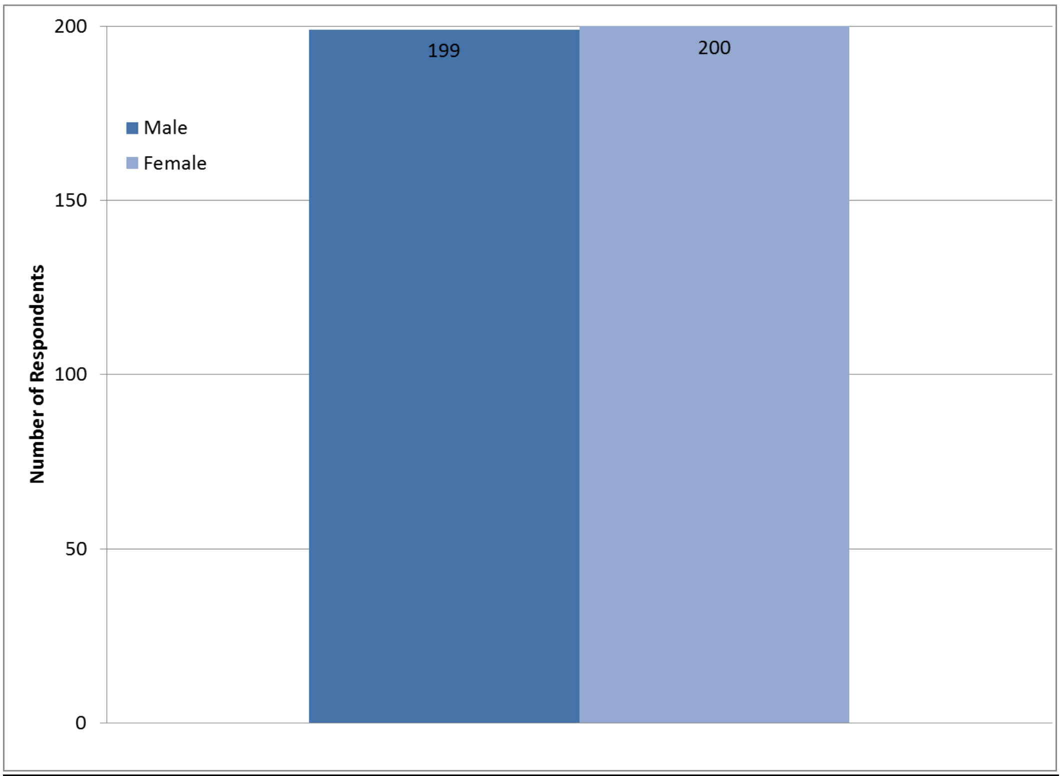
Many thanks for your contribution to my doctoral research! In order to be considered for the R1,000 draw, please SMS your staff number (NB or CC included) to (082) 908-5016. Write this number down before clicking on the 'Done' button.

To ensure fairness, the winning staff number will be randomly picked by the Head of IT Audit and the winner contacted on 6 November 2015.

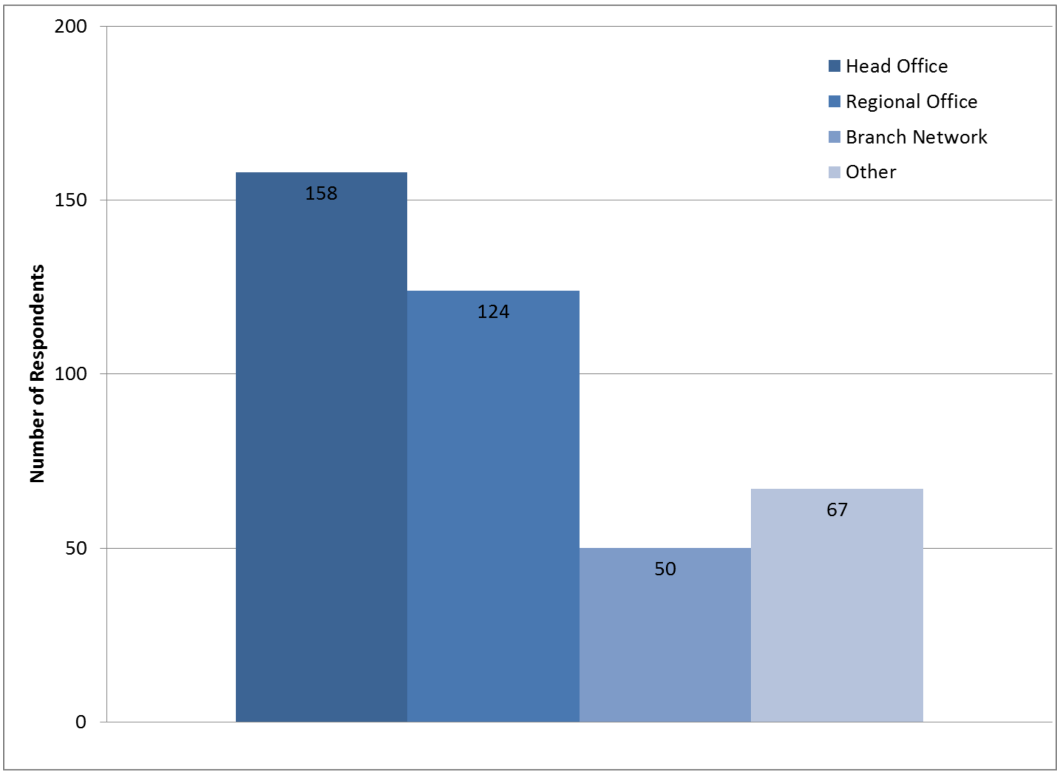
With thanks
Chris Grobler

APPENDIX K: GRAPHICAL DISPLAY OF DEMOGRAPHIC DATA

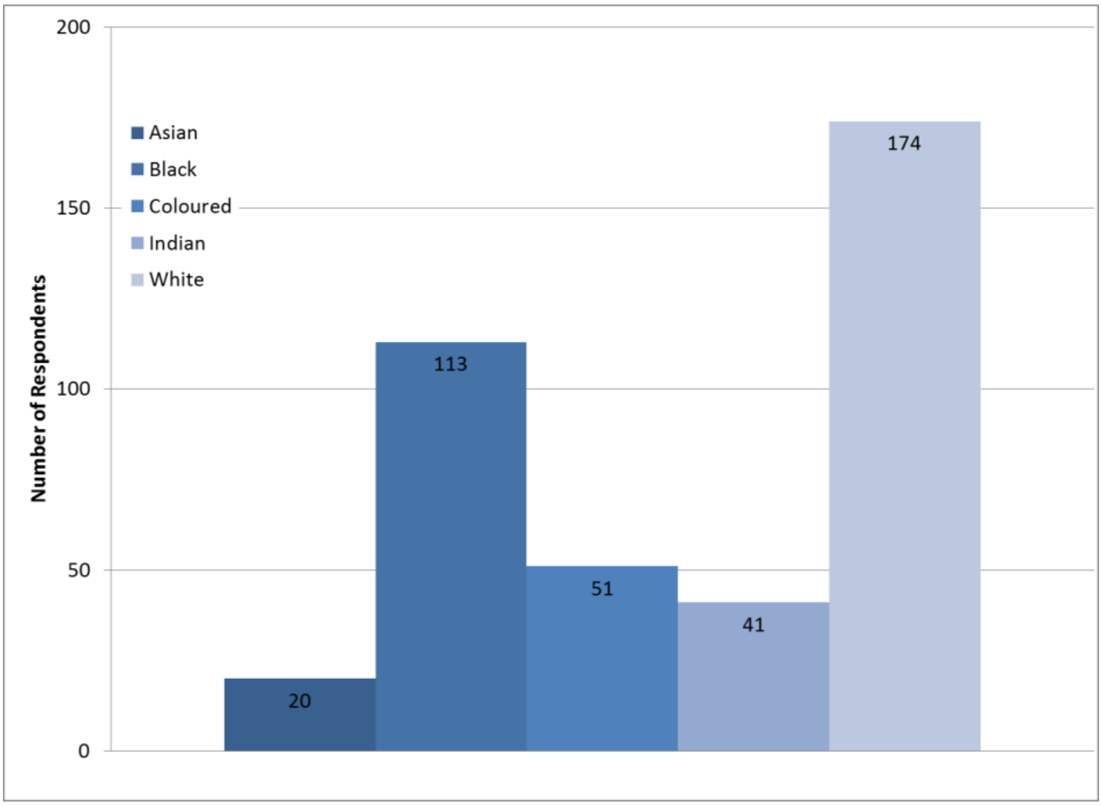
1. Please state your gender.



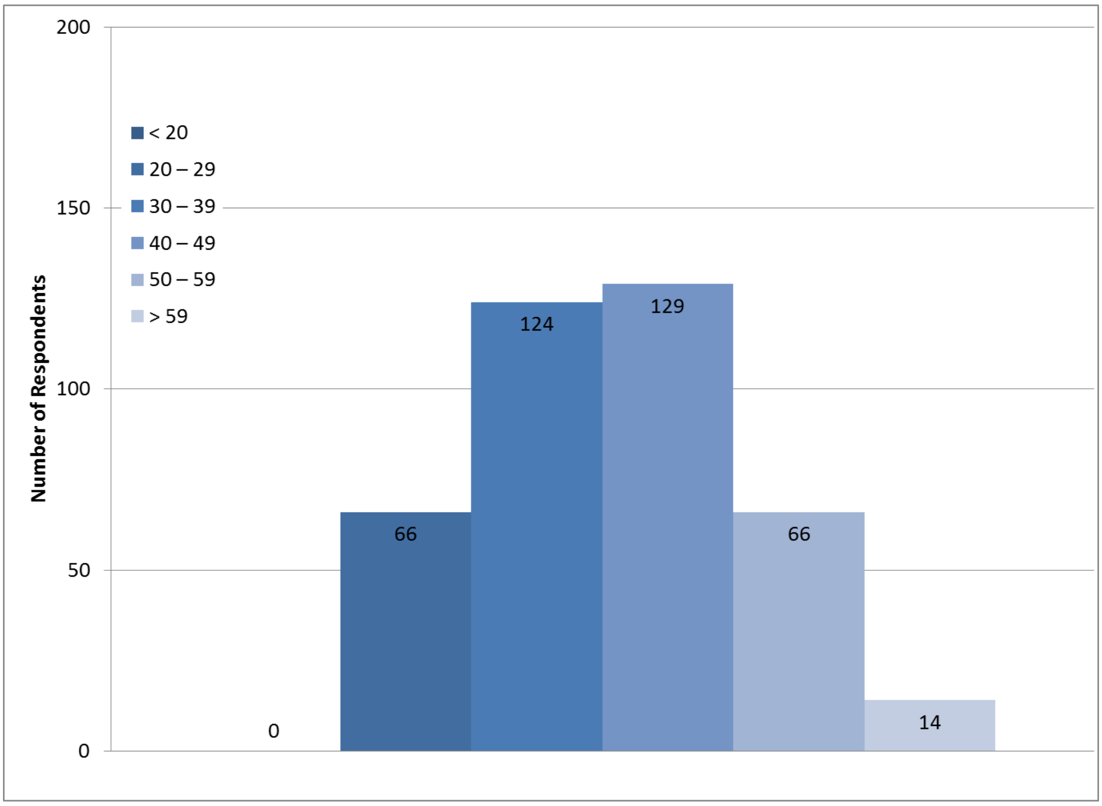
2. Where do you reside?



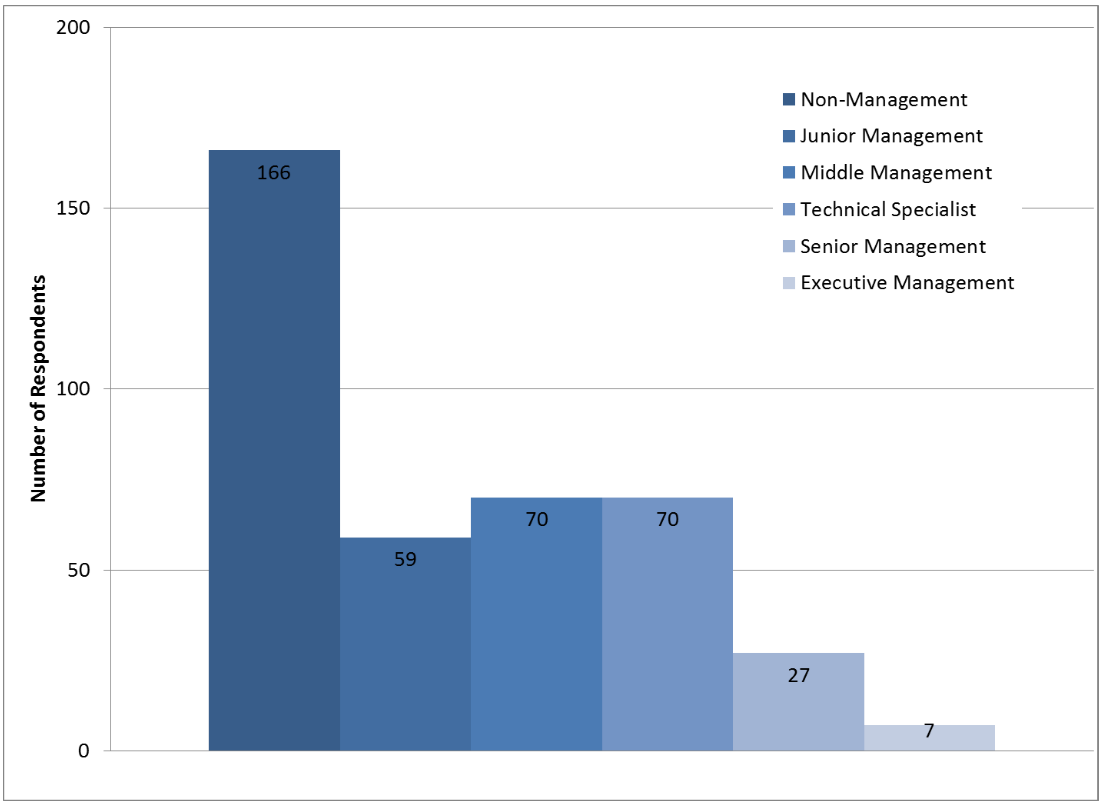
3. Please state your ethnicity.



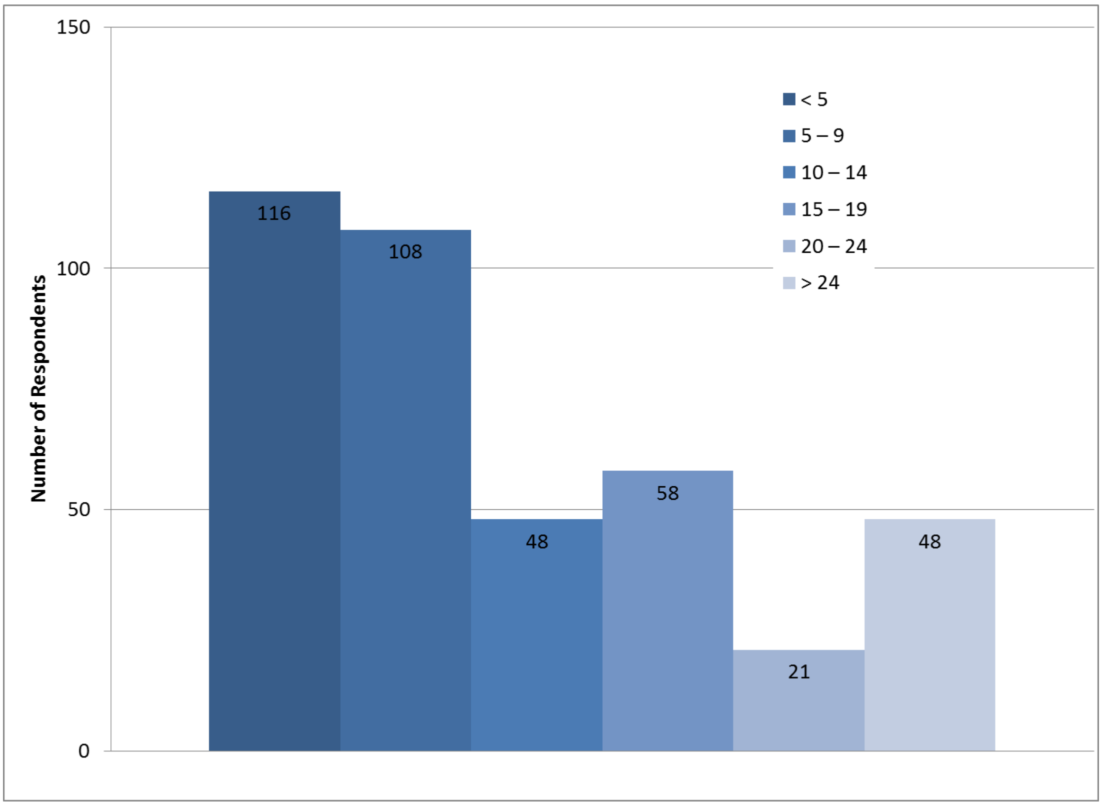
4. Please state you age.



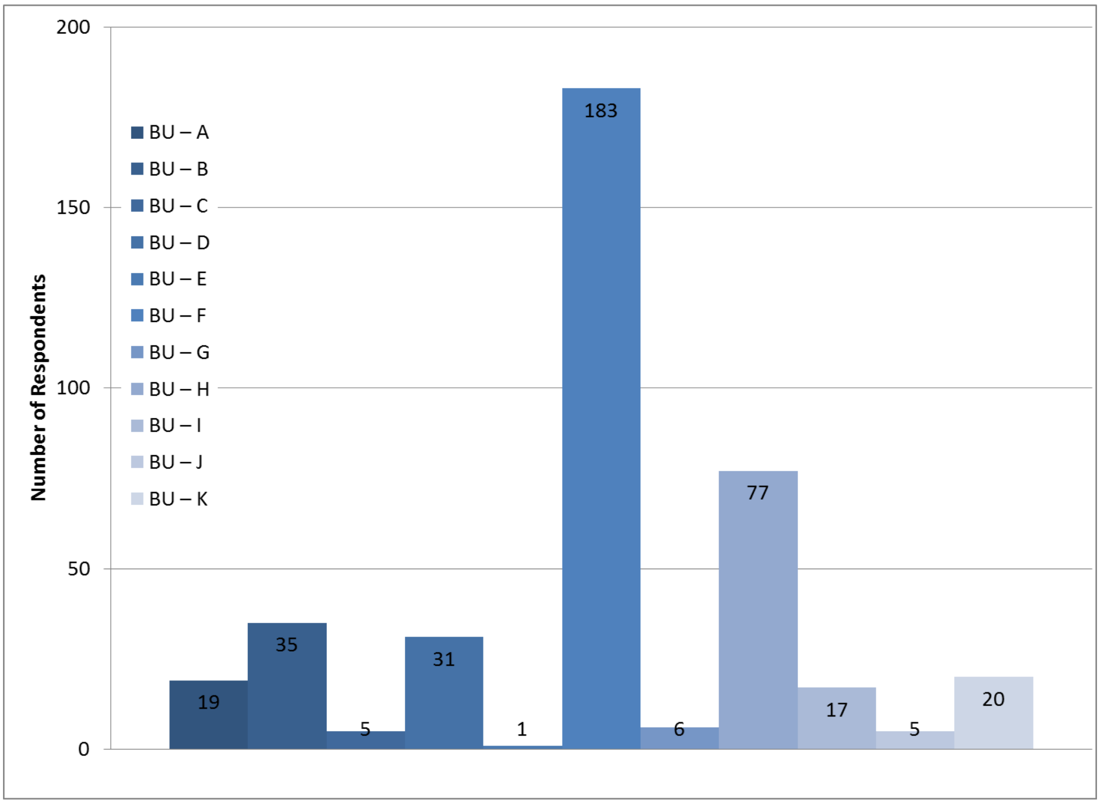
5. Please state your level of seniority in the organisation.



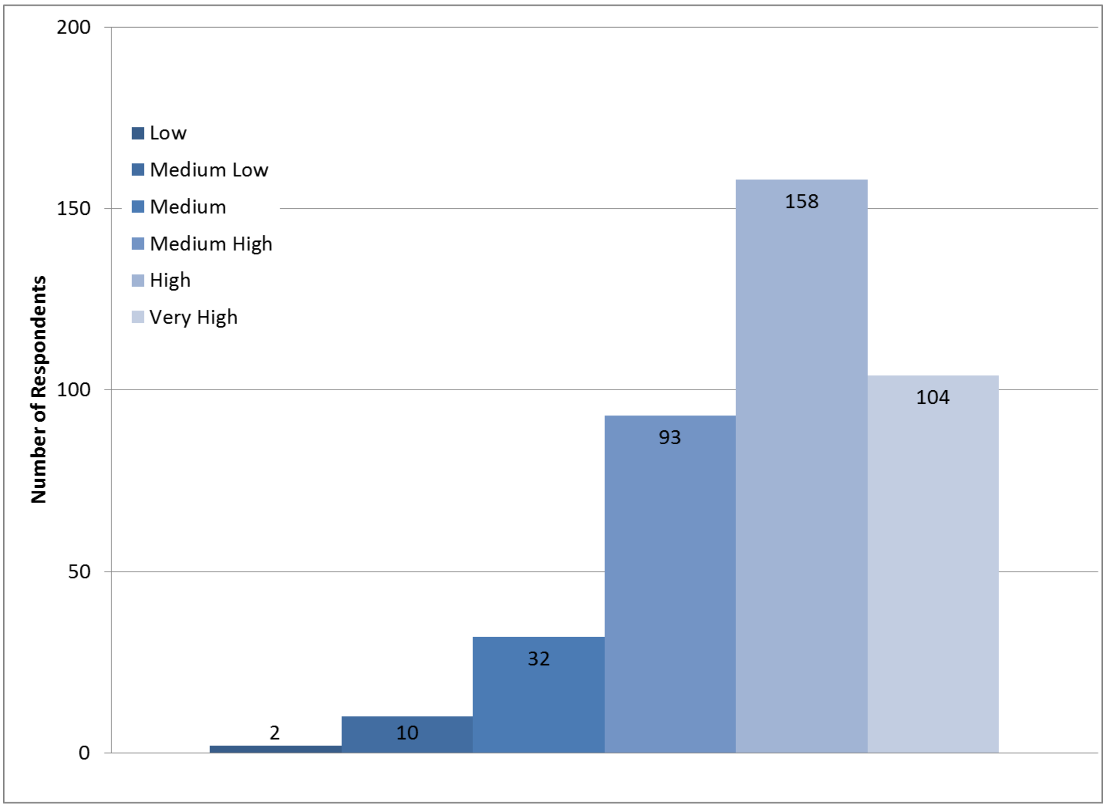
6. How long have you been with the organisation?



7. In which business cluster do you reside?



8. How would you rank your personal proficiency in the use of the organisation's computer systems related to you function?



APPENDIX L: EXPLORATORY FACTOR ANALYSIS (EFA)

L.1. Results from Q1.1 - Q4.5

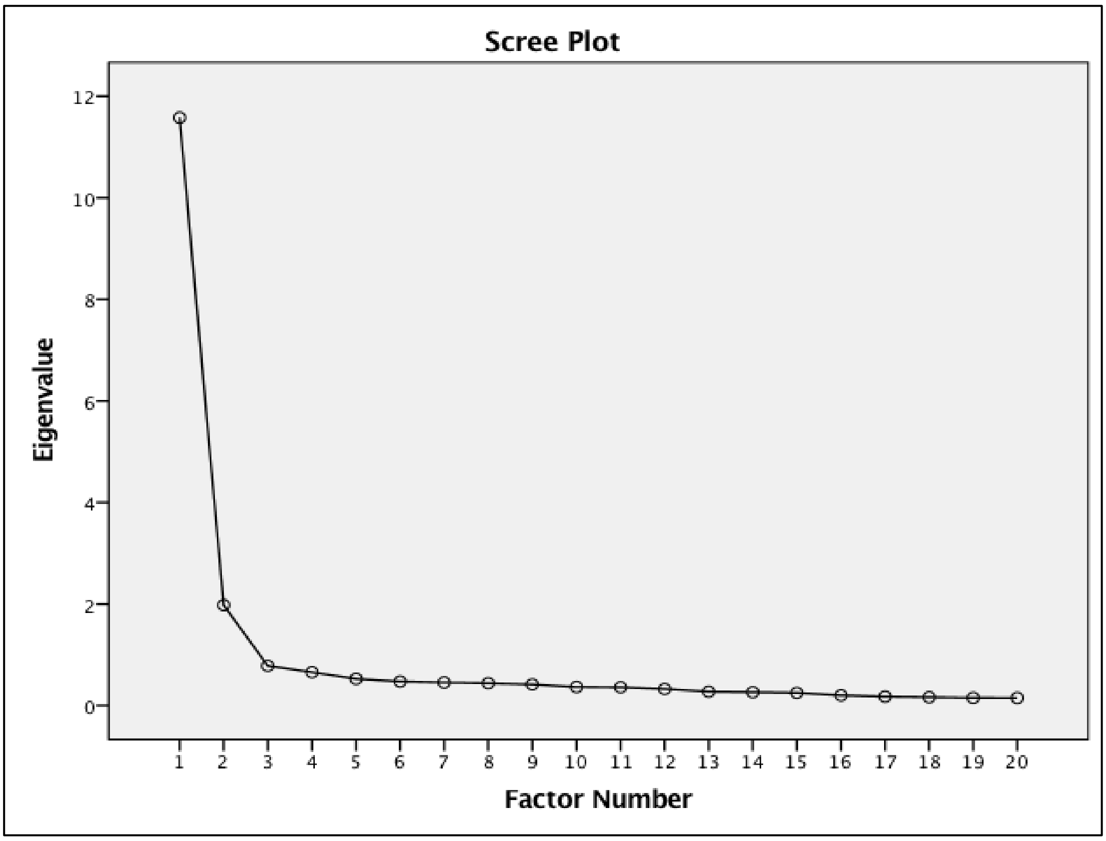
Validity of the data: Testing validity of the scale via Exploratory Factor Analysis.

Total Variance Explained (Extraction Method: Principal Axis Factoring)							
	Initial Eigenvalues			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
Factor	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
1	11.580	57.898	57.898	11.230	56.151	56.151	9.947
2	1.979	9.893	67.791	1.656	8.278	64.430	9.055
3	0.782	3.912	71.703				
4	0.656	3.280	74.983				
5	0.527	2.636	77.620				
6	0.475	2.374	79.994				
7	0.456	2.279	82.273				
8	0.442	2.211	84.484				
9	0.418	2.088	86.572				
10	0.366	1.831	88.403				
11	0.359	1.797	90.200				
12	0.327	1.634	91.834				
13	0.273	1.367	93.201				
14	0.263	1.315	94.516				
15	0.251	1.254	95.770				
16	0.203	1.013	96.783				
17	0.177	0.885	97.668				
18	0.164	0.820	98.488				
19	0.152	0.762	99.250				
20	0.150	0.750	100.000				

KMO and Bartlett's Test			Comment
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.963**	KMO > 0.6 thus appropriate to conduct EFA
Bartlett's Test of Sphericity	Approx. Chi-Square	**6 822.505**	Since Bartlett's Test of Sphericity is < 0.05, Factor Analysis recommended to be suitable
	df	**190**	
	Sig.	**0.000**	

Criteria applied to determine the number of factors		
Factor	**Criteria**	**Comment**
1	Cumulative percentage explained by the factors > 60%	Applicable from factor 2 onwards
2	Eigen values > 1 (also called the Kaiser Guttman rule)	Applicable to factors 1 and 2

The output shows 68% cumulative variance is explained by two factors. Two factors have Eigen values larger than 1, allowing the items/statements to be reduced to said two factors which may be used for the rotation.



Scree Plot for Q1.1 - Q4.5

Pattern Matrix			
Item	Factor		Comment
	1	2	
Q1.3	0.958		Items loading sufficiently on Factor 1. Since three items i.e. Q2.2, Q2.3 & Q2.5 load > 0.4 on Factor 1 and < 0.4 for Factor 2 there is no cross-loading issue.
Q1.2	0.936		
Q1.1	0.918		
Q1.5	0.893		
Q1.4	0.786		
Q3.4	0.743		
Q3.2	0.617		
Q3.1	0.583		
Q2.1	0.525		
Q2.5	0.492	0.396	
Q2.2	0.479	0.392	
Q2.3	0.479	0.395	
Q4.4		0.916	Items loading sufficiently on Factor 2.
Q4.2		0.909	
Q4.5		0.763	
Q4.1		0.733	
Q4.3		0.701	
Q3.3		0.664	
Q3.5		0.592	
Q2.4	0.405	0.478	Cross-loading, both loadings > 0.4.
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization. (Rotation converged in 8 iterations)			

L.2. Results from Q5.1 - Q8.5

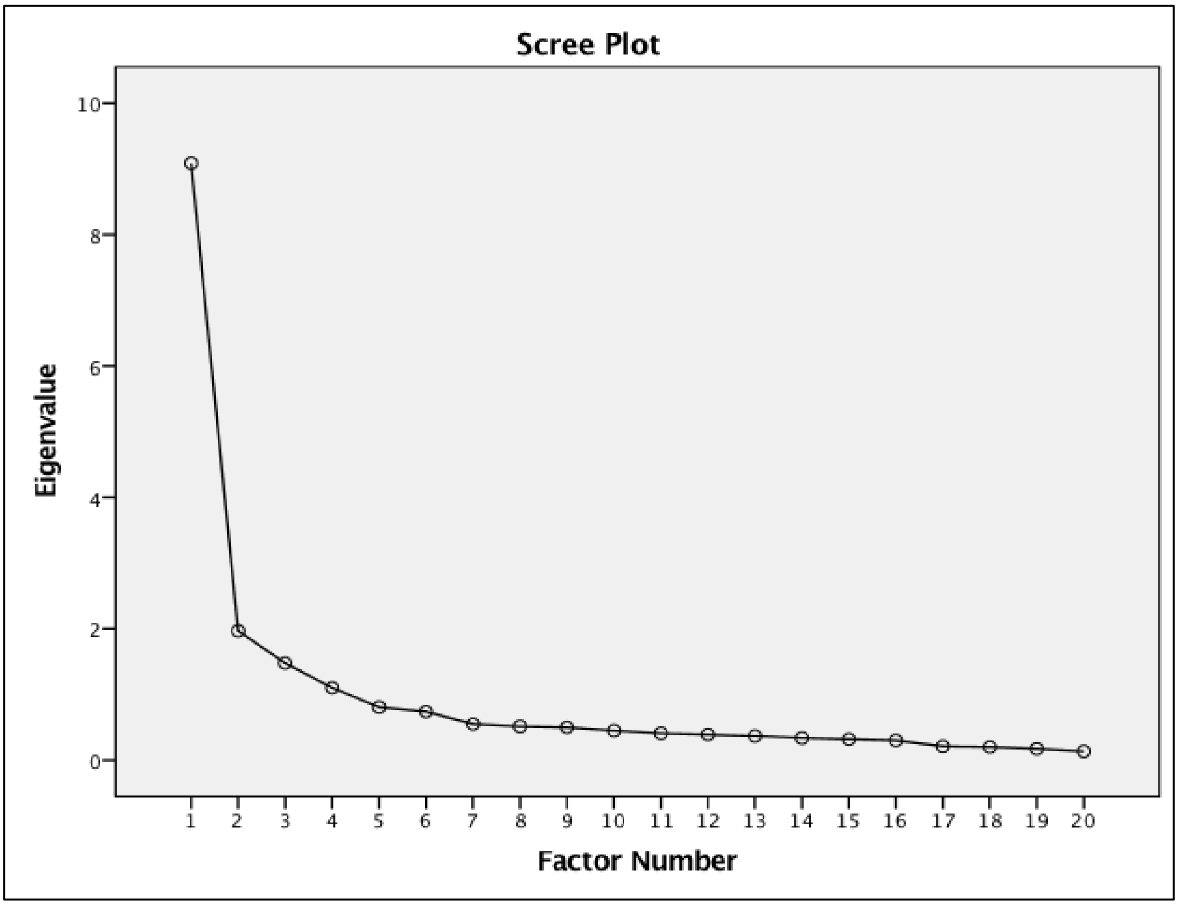
Validity of the data: Testing validity of the scale via Exploratory Factor Analysis.

Total Variance Explained (Extraction Method: Principal Axis Factoring)							
	Initial Eigenvalues			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
Factor	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
1	9.087	45.434	45.434	8.745	43.723	43.723	7.760
2	1.967	9.833	55.266	1.554	7.769	51.492	5.416
3	1.476	7.381	62.647	1.032	5.160	56.652	3.259
4	1.100	5.500	68.147	0.583	2.916	59.567	3.130
5	0.806	4.031	72.177				
6	0.738	3.691	75.869				
7	0.548	2.738	78.607				
8	0.512	2.558	81.165				
9	0.498	2.489	83.654				
10	0.448	2.239	85.892				
11	0.406	2.032	87.924				
12	0.388	1.938	89.863				
13	0.366	1.830	91.693				
14	0.336	1.680	93.373				
15	0.317	1.583	94.956				
16	0.298	1.491	96.447				
17	0.209	1.045	97.492				
18	0.198	0.989	98.481				
19	0.172	0.858	99.338				
20	0.132	0.662	100.000				

KMO and Bartlett's Test			Comment
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.946**	KMO > 0.6 thus appropriate to conduct EFA
Bartlett's Test of Sphericity	Approx. Chi-Square	**5 154.611**	Since Bartlett's Test of Sphericity is < 0.05, Factor Analysis recommended to be suitable
	df	**190**	
	Sig.	**0.000**	

Criteria applied to determine the number of factors		
Factor	**Criteria**	**Comment**
1	Cumulative percentage explained by the factors > 60%	Applicable from factor 3 onwards
2	Eigen values > 1 (also called the Kaiser Guttman rule)	Applicable to factors 1 to 4

The output shows 63% cumulative variance is explained by three factors. Four factors have Eigen values larger than 1, allowing the items/statements to be reduced to said four factors which may be used for the rotation.



Scree Plot for Q5.1 – Q8.5

Pattern Matrix					
Item	**Factor**				**Comment**
	1	**2**	**3**	**4**	
Q8.3	0.914				Items loading sufficiently on Factor 1.
Q8.4	0.890				
Q8.1	0.884				
Q8.5	0.876				
Q8.2	0.847				
Q7.5	0.722				
Q7.2	0.579				
Q5.5		0.812			Items loading sufficiently on Factor 2. Since one item i.e. Q5.3 loads > 0.4 on Factor 2 and < 0.4 for Factor 4 there is no cross-loading issue.
Q5.1		0.735			
Q5.2		0.674			
Q5.3		0.451		0.392	
Q5.4		0.394			Item loading < 0.4 on Factor 2
Q6.3			0.449		Items loading sufficiently on Factor 3. Since four items load > 0.4 on Factor 3 and < 0.4 for Factors 1&4 there is no cross-loading issue
Q7.1	0.377		0.509		
Q7.3	0.364		0.494		
Q7.4	0.383		0.449		
Q6.5			0.404	0.354	
Q6.2				0.525	Items loading sufficiently on Factor 4.
Q6.4				0.484	
Q6.1				0.478	
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization. (Rotation converged in 11 iterations)					

L.3. Results from Q10.1 - Q21.4

Validity of the data: Testing validity of the scale via Exploratory Factor Analysis.

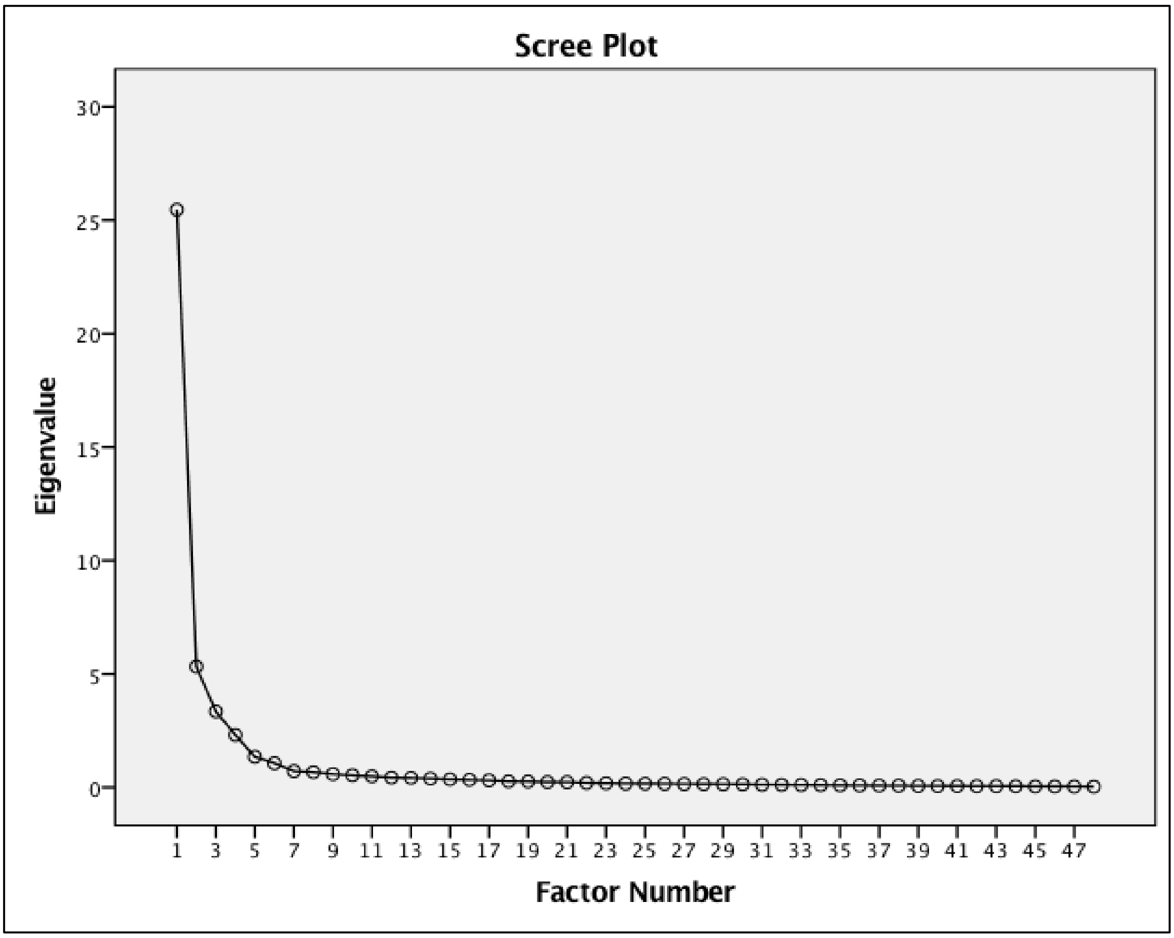
Total Variance Explained (Extraction Method: Principal Axis Factoring)							
Factor	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
1	25.466	53.054	53.054	25.220	52.542	52.542	18.907
2	5.327	11.097	64.151	5.062	10.545	63.087	15.882
3	3.352	6.983	71.134	3.059	6.373	69.460	18.511
4	2.312	4.818	75.952	2.088	4.349	73.809	20.062
5	1.352	2.817	78.769				
6	1.066	2.221	80.990				
7	0.723	1.506	82.497				
8	0.678	1.413	83.910				
9	0.588	1.226	85.135				
10	0.537	1.120	86.255				
11	0.496	1.032	87.288				
12	0.434	0.904	88.192				
13	0.420	0.876	89.068				
14	0.389	0.811	89.878				
15	0.360	0.749	90.627				
16	0.339	0.706	91.333				
17	0.314	0.655	91.988				
18	0.267	0.556	92.544				
19	0.264	0.550	93.094				
20	0.238	0.497	93.591				
21	0.233	0.486	94.076				
22	0.205	0.427	94.503				
23	0.186	0.388	94.891				
24	0.172	0.359	95.250				

Total Variance Explained (Extraction Method: Principal Axis Factoring)							
	Initial Eigenvalues			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
Factor	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
25	0.170	0.355	95.605				
26	0.162	0.337	95.941				
27	0.154	0.321	96.262				
28	0.146	0.304	96.566				
29	0.143	0.297	96.863				
30	0.138	0.287	97.150				
31	0.123	0.257	97.407				
32	0.120	0.249	97.656				
33	0.111	0.230	97.886				
34	0.105	0.218	98.104				
35	0.099	0.207	98.311				
36	0.092	0.193	98.503				
37	0.085	0.177	98.680				
38	0.080	0.166	98.847				
39	0.073	0.152	98.998				
40	0.069	0.145	99.143				
41	0.065	0.135	99.278				
42	0.062	0.130	99.407				
43	0.060	0.126	99.533				
44	0.053	0.110	99.643				
45	0.047	0.098	99.741				
46	0.045	0.093	99.834				
47	0.041	0.086	99.920				
48	0.038	0.080	100.000				

KMO and Bartlett's Test			Comment
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.958**	KMO > 0.6 thus appropriate to conduct EFA
Bartlett's Test of Sphericity	Approx. Chi-Square	**25 909.218**	Since Bartlett's Test of Sphericity is < 0.05, Factor Analysis recommended to be suitable
	df	**1 128**	
	Sig.	**0.000**	

Criteria applied to determine the number of factors		
Factor	**Criteria**	**Comment**
1	Cumulative percentage explained by the factors > 60%	Applicable from factor 2 onwards
2	Eigen values > 1 (also called the Kaiser Guttman rule)	Applicable to factors 1 to 6

The output shows 64% cumulative variance is explained by two factors. Six factors have Eigen values larger than 1, allowing the items/statements to be reduced to said six factors which may be used for the rotation.



Scree Plot for Q10.1 - Q21.4

Pattern Matrix					
Item	Factor				Comment
	1	2	3	4	
Q20.4	0.919				Items loading sufficiently on Factor 1.
Q19.4	0.903				
Q20.3	0.903				
Q20.2	0.871				
Q20.1	0.871				
Q19.3	0.868				
Q21.3	0.832				
Q21.4	0.803				
Q19.2	0.779				
Q21.2	0.744				
Q19.1	0.736				
Q21.1	0.729				
Q11.4		0.857			Items loading sufficiently on Factor 2.
Q11.2		0.830			
Q10.3		0.822			
Q11.3		0.812			
Q10.2		0.797			
Q10.4		0.792			
Q12.3		0.762			
Q12.1		0.751			
Q12.2		0.745			
Q12.4		0.733			
Q11.1		0.727			
Q10.1		0.663			
Q13.4			-0.896		Items loading sufficiently on Factor 3.
Q13.3			-0.884		
Q13.2			-0.872		
Q14.4			-0.858		
Q15.1			-0.853		
Q14.3			-0.841		
Q13.1			-0.839		
Q15.4			-0.829		
Q15.2			-0.815		
Q14.1			-0.814		
Q15.3			-0.798		
Q14.2			-0.797		
Q16.4				-0.949	Items loading sufficiently on Factor 4.
Q17.4				-0.936	
Q17.3				-0.912	
Q18.4				-0.909	
Q18.3				-0.893	
Q16.3				-0.887	
Q17.2				-0.877	
Q16.2				-0.833	
Q16.1				-0.789	
Q17.1				-0.768	
Q18.2				-0.752	
Q18.1				-0.703	
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization. (Rotation converged in 13 iterations)					

APPENDIX M: RELIABILITY: INTERNAL CONSISTENCY

Reliability of the data

This section describes the reliability of the study as a whole. Construct reliability (internal consistency) as displayed below was explicitly tested with item analysis. The following were evaluated during the construct reliability testing of the dimensions in the questionnaire: Variables, Items, Items left out, Mean, SD, Cronbach Alpha, and Reliability.

Construct	Variables	Items	Items left out	Mean	SD	Cronbach Alpha	Reliability
1	Behavioural Beliefs & Attitudes	Q1.1 Q1.2 Q1.3 Q1.4 Q1.5 Q2.1 Q2.2 Q2.3 Q2.5 Q3.1 Q3.2 Q3.4	None	66.77	12.94	0.955	Good
2	Behavioural Intentions	Q4.1 Q4.2 Q4.3 Q4.4 Q4.5 Q3.3 Q3.5	Q2.4 out	43.11	5.45	0.912	Good
3	Unintentional Misuse	Q5.1 Q5.2 Q5.3 Q5.4 Q5.5	None	14.99	6.33	0.817	Good
4	Passive Disuse	Q6.1 Q6.2 Q6.4	None	7.48	4.00	0.772	Acceptable
5	Active Abuse	Q7.1 Q7.3 Q7.4 Q6.3 Q6.5	None	18.25	6.26	0.739	Acceptable
6	Intentional Sabotage	Q8.1 Q8.2 Q8.3 Q8.4 Q8.5 Q7.2 Q7.5	None	17.37	9.13	0.944	Good
7	System Controls	Q10.1 Q10.2 Q10.3 Q10.4 Q11.1 Q11.2 Q11.3 Q11.4 Q12.1 Q12.2 Q12.3 Q12.4	None	55.11	17.03	0.955	Good
8	Management Oversight	Q13.1 Q13.2 Q13.3 Q13.4 Q14.1 Q14.2 Q14.3 Q14.4 Q15.1 Q15.2 Q15.3 Q15.4	None	56.06	16.67	0.973	Good
9	Leadership’s Influence	Q16.1 Q16.2 Q16.3 Q16.4 Q17.1 Q17.2 Q17.3 Q17.4 Q18.1 Q18.2 Q18.3 Q18.4	None	56.71	16.91	0.978	Good
10	Colleagues’ Influence	Q19.1 Q19.2 Q19.3 Q19.4 Q20.1 Q20.2 Q20.3 Q20.4 Q21.1 Q21.2 Q21.3 Q21.4	None	55.56	15.25	0.973	Good

APPENDIX N: EFA RESULTS

N.1. Results from Q1.1 - Q4.5

	Item	Factor 1	Factor 2	Testing	Comment
Q1.1	The computer systems of the organisation are simple to navigate.			Behavioural Beliefs & Attitudes	
Q1.2	The computer systems of the organisation are easy to use.			Behavioural Beliefs & Attitudes	
Q1.3	The computer systems of the organisation are not difficult to use.			Behavioural Beliefs & Attitudes	
Q1.4	The computer systems of the organisation reduce my work stress.			Behavioural Beliefs & Attitudes	
Q1.5	The computer systems of the organisation are easy to understand.			Behavioural Beliefs & Attitudes	
Q2.1	The computer systems of the organisation are aligned to my work requirements.			Behavioural Beliefs & Attitudes	
Q2.2	The computer systems of the organisation enable me to perform my work faster.			Behavioural Beliefs & Attitudes	
Q2.3	The computer systems of the organisation ensures that I can do my work more accurately.			Behavioural Beliefs & Attitudes	
Q2.5	The computer systems of the organisation enable me to do my work more effectively.			Behavioural Beliefs & Attitudes	
Q3.1	When making use of computer systems, I feel positive.			Behavioural Beliefs & Attitudes	
Q3.2	When making use of computer systems, my state of mind is positively influenced.			Behavioural Beliefs & Attitudes	
Q3.4	When making use of computer systems, I find it to be a pleasant experience.			Behavioural Beliefs & Attitudes	
Q3.3	Requiring employees to make use of computer systems is a good idea.			Behavioural Intention	Item does not fit construct
Q3.5	When making use of computer systems, I am thankful for having the use of a computer to enhance my work experience.			Behavioural Intention	Item does not fit construct
Q4.1	I plan to make use of all relevant computer systems.			Behavioural Intention	
Q4.2	I plan to utilise computer systems to do my work.			Behavioural Intention	
Q4.3	I will make use of prescribed computer systems.			Behavioural Intention	
Q4.4	I will use computer systems to perform my work tasks.			Behavioural Intention	
Q4.5	I will choose to employ computer systems to help me with my work.			Behavioural Intention	
Q2.4	The computer systems of the organisation results in better quality work being produced by me.			Low loading (<0.4)	Disregard item

N.2. Results from Q5.1 - Q8.5

	Item	Factor 1	Factor 2	Factor 3	Factor 4	Testing	Comment
Q7.2	Employees abuse the organisation's computer systems for their own benefit.					Intentional Sabotage	Item does not fit construct
Q7.5	Employees make use of the organisation's computer systems to access, view, and even sell personal employee or client information to third parties.					Intentional Sabotage	Item does not fit construct
Q8.1	Employees collude with third parties to sabotage the organisation's computer systems.					Intentional Sabotage	
Q8.2	Employees intentionally disrupt the operations of the organisation's computer systems.					Intentional Sabotage	
Q8.3	Employees deliberately damage the organisation's computer systems.					Intentional Sabotage	
Q8.4	Employees purposely break a particular computer system so that they will be forced to make use of another computer system that they prefer to use.					Intentional Sabotage	
Q8.5	Employees become disgruntled and then intentionally cause damage to the organisation's computer systems.					Intentional Sabotage	
Q5.1	I sometimes make mistakes while using computer systems without realising it.					Unintentional Misuse	
Q5.2	I sometimes make errors when using computer systems, and do not know how to correct my mistakes without assistance.					Unintentional Misuse	
Q5.3	I work at a slow pace because I am forced to make use of particular computer systems which I do not like.					Unintentional Misuse	
Q5.5	I sometimes have to redo work on certain computer systems because I accidentally made mistakes the first time around.					Unintentional Misuse	
Q6.3	I prefer to make use of computer systems because they are easy to use and not because they are prescribed by management.					Active Abuse	Disregard item
Q6.5	I make use of the computer system on which I can perform my work the fastest and not necessarily the one which I am forced to make use of.					Active Abuse	Disregard item
Q7.1	Employees make use of the organisation's computer systems for personal gain.					Active Abuse	
Q7.3	Employees take advantage of the organisation's computer systems to enrich themselves.					Active Abuse	
Q7.4	Employees conduct personal business on the organisation's computer systems.					Active Abuse	
Q6.1	I do not always make use of computer systems that I am instructed to use.					Passive Disuse	
Q6.2	I make use of alternative (preferred) computer systems, rather than the prescribed computer systems.					Passive Disuse	
Q6.4	I complete my work on more than one computer system because I do not know how to complete some processes start-to-end on the prescribed computer system.					Passive Disuse	
Q5.4	I am instructed to make use of a computer system which I do not properly understand.					Low loading (<0.4)	Disregard item

N.3. Results from Q10.1 - Q21.4

Item		Items	Factor 1	2	3	4	Testing	Comment
Q19.1	How effective do you think the influence of your colleagues is to instil positive **BELIEFS** within employees to not engage in the following behaviours?	Users **un**intentionally making mistakes when using computer systems.					Influence of Colleagues	Colleagues (Beliefs)
Q19.2		Users making use of **in**correct computer systems when doing work.					Influence of Colleagues	Colleagues (Beliefs)
Q19.3		Users abusing computer systems for their personal benefit					Influence of Colleagues	Colleagues (Beliefs)
Q19.4		Users intentionally sabotaging computer systems					Influence of Colleagues	Colleagues (Beliefs)
Q20.1	How effective do you think the influence of your colleagues is to instil positive **ATTITUDES** within employees to not engage in the following behaviours?	Users **un**intentionally making mistakes when using computer systems.					Influence of Colleagues	Colleagues (Attitudes)
Q20.2		Users making use of **in**correct computer systems when doing work.					Influence of Colleagues	Colleagues (Attitudes)
Q20.3		Users abusing computer systems for their personal benefit					Influence of Colleagues	Colleagues (Attitudes)
Q20.4		Users intentionally sabotaging computer systems					Influence of Colleagues	Colleagues (Attitudes)
Q21.1	How effective do you think the influence of your colleagues is to instil positive **INTENTIONS** within employees to not engage in the following behaviours?	Users **un**intentionally making mistakes when using computer systems.					Influence of Colleagues	Colleagues (Intention)
Q21.2		Users making use of **in**correct computer systems when doing work.					Influence of Colleagues	Colleagues (Intention)
Q21.3		Users abusing computer systems for their personal benefit					Influence of Colleagues	Colleagues (Intention)
Q21.4		Users intentionally sabotaging computer systems					Influence of Colleagues	Colleagues (Intention)
Q10.1	How effective do you think the introduction of computer/system controls are to **PREVENT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.					Introduction of System Controls	System Controls
Q10.2		Users making use of **in**correct computer systems when doing work.					Introduction of System Controls	System Controls
Q10.3		Users abusing computer systems for their personal benefit.					Introduction of System Controls	System Controls
Q10.4		Users intentionally sabotaging computer systems.					Introduction of System Controls	System Controls
Q11.1	How effective do you think the introduction of computer/system controls are to **DETECT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.					Introduction of System Controls	System Controls (Detective)
Q11.2		Users making use of **in**correct computer systems when doing work.					Introduction of System Controls	System Controls (Detective)
Q11.3		Users abusing computer systems for their personal benefit.					Introduction of System Controls	System Controls (Detective)
Q11.4		Users intentionally sabotaging computer systems.					Introduction of System Controls	System Controls (Detective)
Q12.1	How effective do you think the introduction of computer/system controls are to **CORRECT** the following behaviours?	Users **un**intentionally making mistakes when using computer systems.					Introduction of System Controls	System Controls (Corrective)
Q12.2		Users making use of **in**correct computer systems when doing work.					Introduction of System Controls	System Controls (Corrective)
Q12.3		Users abusing computer systems for their personal benefit.					Introduction of System Controls	System Controls (Corrective)
Q12.4		Users intentionally sabotaging computer systems.					Introduction of System Controls	System Controls (Corrective)

N.3. Results from Q10.1 - Q21.4 (cont.)

Item		Items	Factor 1	Factor 2	Factor 3	Factor 4	Testing	Comment
Q13.1	How effective do you think the introduction of <u>management oversight</u> is to **PREVENT** the following behaviours?	Users **<u>un</u>**intentionally making mistakes when using computer systems.					Introduction of Management Oversight	Management Oversight
Q13.2		Users making use of **<u>in</u>**correct computer systems when doing work.					Introduction of Management Oversight	Management Oversight
Q13.3		Users abusing computer systems for their personal benefit.					Introduction of Management Oversight	Management Oversight
Q13.4		Users intentionally sabotaging computer systems.					Introduction of Management Oversight	Management Oversight
Q14.1	How effective do you think the introduction of <u>management oversight</u> is to **DETECT** the following behaviours?	Users **<u>un</u>**intentionally making mistakes when using computer systems.					Introduction of Management Oversight	Management Oversight
Q14.2		Users making use of **<u>in</u>**correct computer systems when doing work.					Introduction of Management Oversight	Management Oversight
Q14.3		Users abusing computer systems for their personal benefit.					Introduction of Management Oversight	Management Oversight
Q14.4		Users intentionally sabotaging computer systems.					Introduction of Management Oversight	Management Oversight
Q15.1	How effective do you think the introduction of <u>management oversight</u> is to **CORRECT** the following behaviours?	Users **<u>un</u>**intentionally making mistakes when using computer systems.					Introduction of Management Oversight	Management Oversight
Q15.2		Users making use of **<u>in</u>**correct computer systems when doing work.					Introduction of Management Oversight	Management Oversight
Q15.3		Users abusing computer systems for their personal benefit.					Introduction of Management Oversight	Management Oversight
Q15.4		Users intentionally sabotaging computer systems.					Introduction of Management Oversight	Management Oversight
Q16.1	How effective do you think the influence of your <u>organisation's leaders</u> is to instil positive **BELIEFS** within employees to not engage in the following behaviours?	Users **<u>un</u>**intentionally making mistakes when using computer systems.					Influence of Leadership	Leadership (Beliefs)
Q16.2		Users making use of **<u>in</u>**correct computer systems when doing work.					Influence of Leadership	Leadership (Beliefs)
Q16.3		Users abusing computer systems for their personal benefit.					Influence of Leadership	Leadership (Beliefs)
Q16.4		Users intentionally sabotaging computer systems.					Influence of Leadership	Leadership (Beliefs)
Q17.1	How effective do you think the influence of your <u>organisation's leaders</u> is to instil positive **ATTITUDES** within employees to not engage in the following behaviours?	Users **<u>un</u>**intentionally making mistakes when using computer systems.					Influence of Leadership	Leadership (Attitudes)
Q17.2		Users making use of **<u>in</u>**correct computer systems when doing work.					Influence of Leadership	Leadership (Attitudes)
Q17.3		Users abusing computer systems for their personal benefit.					Influence of Leadership	Leadership (Attitudes)
Q17.4		Users intentionally sabotaging computer systems.					Influence of Leadership	Leadership (Attitudes)
Q18.1	How effective do you think the influence of your <u>organisation's leaders</u> is to instil positive **INTENTIONS** within employees to not engage in the following behaviours?	Users **<u>un</u>**intentionally making mistakes when using computer systems.					Influence of Leadership	Leadership (Intention)
Q18.2		Users making use of **<u>in</u>**correct computer systems when doing work.					Influence of Leadership	Leadership (Intention)
Q18.3		Users abusing computer systems for their personal benefit.					Influence of Leadership	Leadership (Intention)
Q18.4		Users intentionally sabotaging computer systems.					Influence of Leadership	Leadership (Intention)

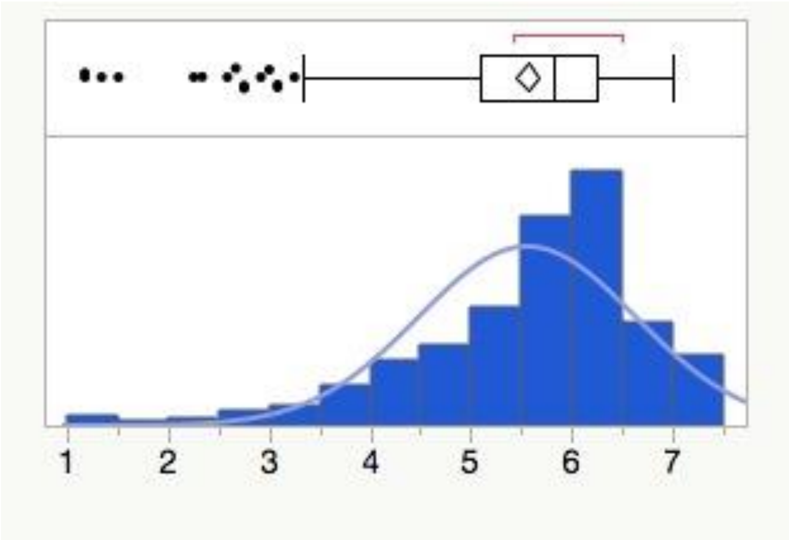
APPENDIX O: EXPLORATORY ANALYSIS

O.1. Spearman Rho per construct variable

Variable	by Variable	Spearman ρ	Prob > |ρ|	Sig	Graphic presentation of Spearman ρ
Passive Disuse	Behavioural Intention	-0.3592	<.0001*	Y	
Unintentional Misuse	Behavioural Beliefs & Attitudes	-0.2534	<.0001*	Y	
Passive Disuse	Behavioural Beliefs & Attitudes	-0.2345	<.0001*	Y	
Unintentional Misuse	Behavioural Intention	-0.2177	<.0001*	Y	
Intentional Sabotage	Behavioural Intention	-0.2154	<.0001*	Y	
Influence of Leadership	Intentional Sabotage	-0.2144	<.0001*	Y	
Influence of Leadership	Passive Disuse	-0.1943	<.0001*	Y	
Influence of Colleagues	Intentional Sabotage	-0.1828	0.0002*	Y'	
Influence of Colleagues	Passive Disuse	-0.1791	0.0003*	Y'	
Introduction of System Controls	Passive Disuse	-0.1621	0.0012*	Y'	
Introduction of Management Oversight	Passive Disuse	-0.1441	0.0039*	Y'	
Introduction of System Controls	Intentional Sabotage	-0.1318	0.0084*	Y'	
Intentional Sabotage	Behavioural Beliefs & Attitudes	-0.1006	0.0446*	Y'	
Introduction of Management Oversight	Intentional Sabotage	-0.0949	0.0583	N	
Active Abuse	Behavioural Intention	-0.0889	0.0761	N	
Influence of Leadership	Unintentional Misuse	-0.0799	0.111	N	
Influence of Leadership	Active Abuse	-0.0751	0.1341	N	
Influence of Colleagues	Active Abuse	-0.0669	0.1822	N	
Influence of Colleagues	Unintentional Misuse	-0.0592	0.2378	N	
Introduction of Management Oversight	Unintentional Misuse	-0.0189	0.7071	N	
Introduction of System Controls	Unintentional Misuse	0.0005	0.9916	N	
Introduction of Management Oversight	Active Abuse	0.0113	0.8216	N	
Active Abuse	Behavioural Beliefs & Attitudes	0.0179	0.7222	N	
Introduction of System Controls	Active Abuse	0.0445	0.3757	N	
Introduction of Management Oversight	Behavioural Beliefs & Attitudes	0.0891	0.0755	N	
Influence of Colleagues	Behavioural Beliefs & Attitudes	0.0898	0.0732	N	
Introduction of System Controls	Behavioural Beliefs & Attitudes	0.1311	0.0087*	Y'	
Influence of Colleagues	Behavioural Intention	0.1363	0.0064*	Y'	
Introduction of Management Oversight	Behavioural Intention	0.1410	0.0048*	Y'	
Influence of Leadership	Behavioural Beliefs & Attitudes	0.1870	0.0002*	Y'	
Influence of Leadership	Behavioural Intention	0.2056	<.0001*	Y	
Introduction of System Controls	Behavioural Intention	0.2372	<.0001*	Y	
Active Abuse	Unintentional Misuse	0.3978	<.0001*	Y	
Passive Disuse	Active Abuse	0.4326	<.0001*	Y	
Unintentional Misuse	Intentional Sabotage	0.4572	<.0001*	Y	
Introduction of System Controls	Influence of Colleagues	0.4637	<.0001*	Y	
Influence of Leadership	Introduction of System Controls	0.4961	<.0001*	Y	
Introduction of Management Oversight	Influence of Colleagues	0.5105	<.0001*	Y	
Passive Disuse	Unintentional Misuse	0.5549	<.0001*	Y	
Passive Disuse	Intentional Sabotage	0.5716	<.0001*	Y	
Active Abuse	Intentional Sabotage	0.6096	<.0001*	Y	
Introduction of Management Oversight	Introduction of System Controls	0.6159	<.0001*	Y	
Influence of Leadership	Introduction of Management Oversight	0.6171	<.0001*	Y	
Behavioural Intention	Behavioural Beliefs & Attitudes	0.6414	<.0001*	Y	
Influence of Leadership	Influence of Colleagues	0.7066	<.0001*	Y	

O.2. Summary statistics related to Behavioural Beliefs & Attitudes

Behavioural Beliefs & Attitudes



Normal	(5.564, 1.079)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		7.000
90.0%		6.917
75.0%	quartile	6.250
50.0%	median	5.833
25.0%	quartile	5.083
10.0%		4.083
2.5%		2.750
0.5%		1.167
0.0%	minimum	1.167

Fitted Normal

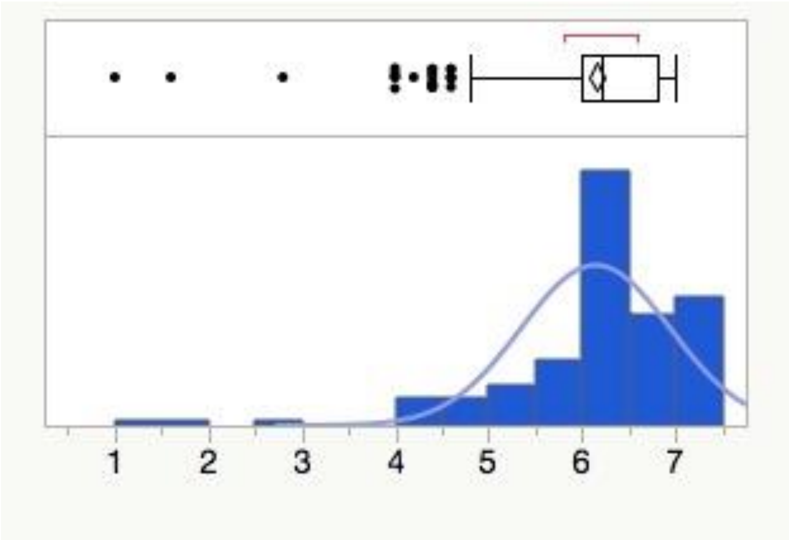
Summary Statistics	
Mean	5.564
Std Dev	1.079
Std Err Mean	0.054
Upper 95% Mean	5.670
Lower 95% Mean	5.458
N	399
Skewness	-1.222
Kurtosis	1.979

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	5.564	5.458	5.670
Dispersion	σ	1.079	1.009	1.159

-2log(Likelihood) =	1191.668

O.3. Summary statistics related to Behavioural Intention

Behavioural Intention



Normal	(6.148, 0.798)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		7.000
90.0%		7.000
75.0%	quartile	6.800
50.0%	median	6.200
25.0%	quartile	6.000
10.0%		5.200
2.5%		4.400
0.5%		1.600
0.0%	minimum	1.000

Fitted Normal

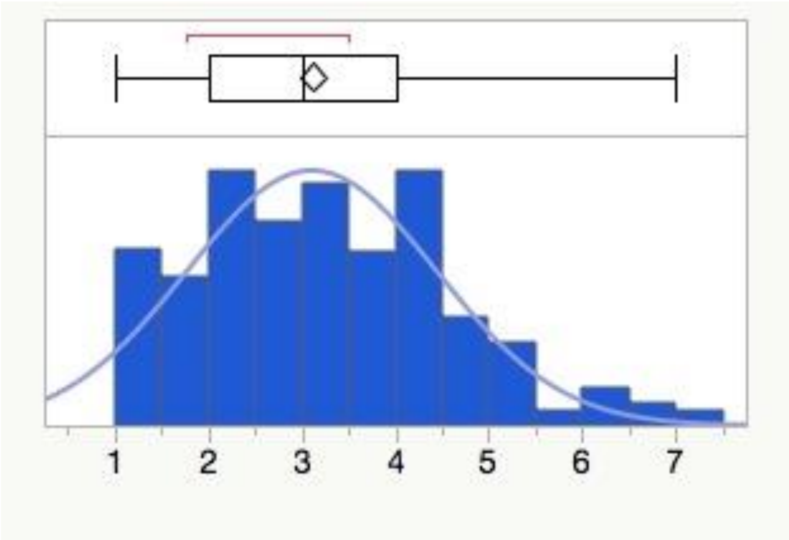
Summary Statistics	
Mean	6.148
Std Dev	0.798
Std Err Mean	0.040
Upper 95% Mean	6.227
Lower 95% Mean	6.070
N	399
Skewness	-1.874
Kurtosis	6.996

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	6.148	6.070	6.227
Dispersion	σ	0.798	0.746	0.858

-2log(Likelihood) =	951.386

O.4. Summary statistics related to Unintentional Misuse

Unintentional Misuse



Normal	(3.110, 1.335)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		6.250
90.0%		4.750
75.0%	quartile	4.000
50.0%	median	3.000
25.0%	quartile	2.000
10.0%		1.250
2.5%		1.000
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

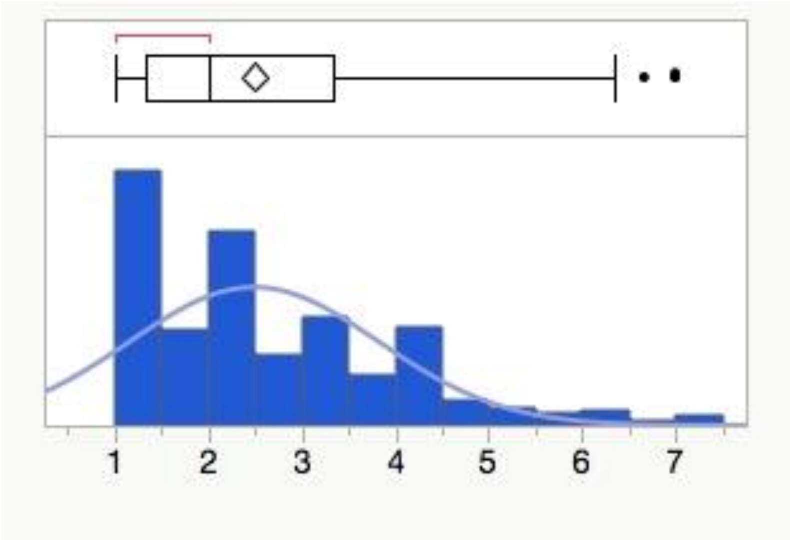
Summary Statistics	
Mean	3.110
Std Dev	1.335
Std Err Mean	0.067
Upper 95% Mean	3.241
Lower 95% Mean	2.978
N	399
Skewness	0.450
Kurtosis	-0.156

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	3.110	2.978	3.241
Dispersion	σ	1.335	1.248	1.435

-2log(Likelihood) =	1361.917

O.5. Summary statistics related to Passive Disuse

Passive Disuse



Normal	(2.492, 1.333)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		5.667
90.0%		4.333
75.0%	quartile	3.333
50.0%	median	2.000
25.0%	quartile	1.333
10.0%		1.000
2.5%		1.000
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

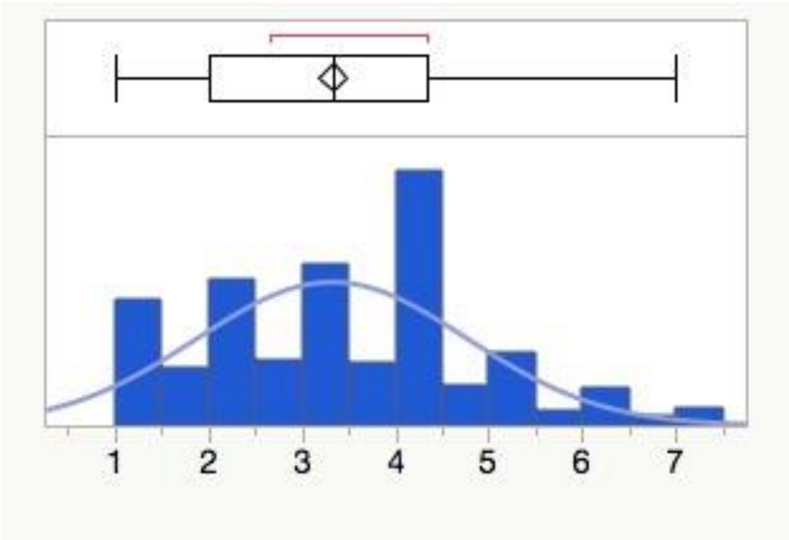
Summary Statistics	
Mean	2.492
Std Dev	1.333
Std Err Mean	0.067
Upper 95% Mean	2.623
Lower 95% Mean	2.361
N	399
Skewness	0.924
Kurtosis	0.462

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	2.492	2.361	2.623
Dispersion	σ	1.333	1.246	1.432

-2log(Likelihood) =	1360.477

O.6. Summary statistics related to Active Abuse

Active Abuse



Normal	(3.327, 1.446)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		6.333
90.0%		5.000
75.0%	quartile	4.333
50.0%	median	3.333
25.0%	quartile	2.000
10.0%		1.000
2.5%		1.000
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

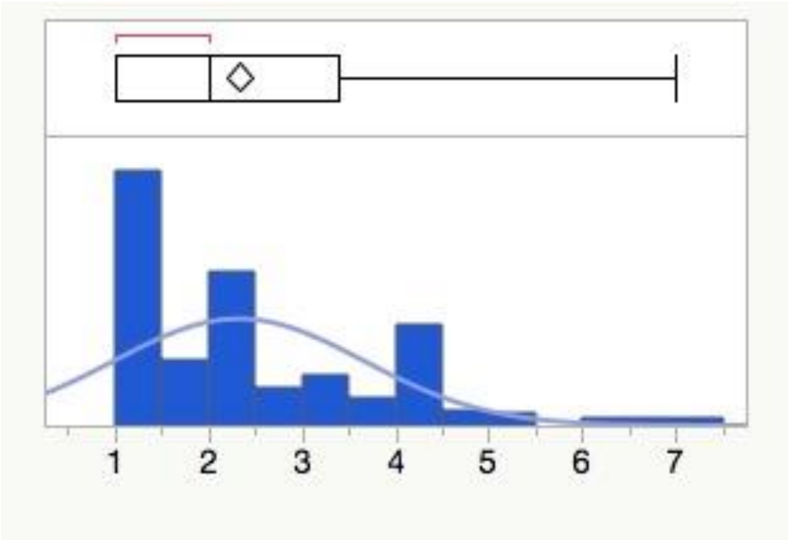
Summary Statistics	
Mean	3.327
Std Dev	1.446
Std Err Mean	0.072
Upper 95% Mean	3.470
Lower 95% Mean	3.185
N	399
Skewness	0.218
Kurtosis	-0.402

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	3.327	3.185	3.470
Dispersion	σ	1.446	1.352	1.553

-2log(Likelihood) =	1425.361

O.7. Summary statistics related to Intentional Sabotage

Intentional Sabotage



Normal (2.329, 1.336)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		5.400
90.0%		4.000
75.0%	quartile	3.400
50.0%	median	2.000
25.0%	quartile	1.000
10.0%		1.000
2.5%		1.000
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

Summary Statistics	
Mean	2.329
Std Dev	1.336
Std Err Mean	0.067
Upper 95% Mean	2.461
Lower 95% Mean	2.198
N	399
Skewness	1.060
Kurtosis	0.751

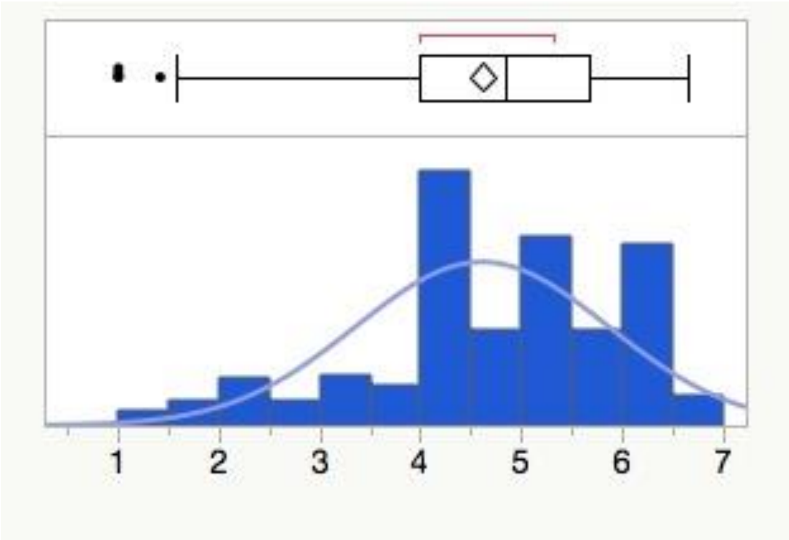
Parameter Estimates

Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	2.329	2.198	2.461
Dispersion	σ	1.336	1.249	1.435

-2log(Likelihood) = 1362.331

O.8. Summary statistics related to Influence of Colleagues

Influence of Colleagues



Normal	(4.617, 1.254)

Quantiles		
100.0%	maximum	6.667
99.5%		6.667
97.5%		6.667
90.0%		6.000
75.0%	quartile	5.667
50.0%	median	4.833
25.0%	quartile	4.000
10.0%		2.917
2.5%		1.750
0.5%		1.000
0.0%	minimum	1.000

Summary Statistics	
Mean	4.617
Std Dev	1.254
Std Err Mean	0.063
Upper 95% Mean	4.740
Lower 95% Mean	4.493
N	399
Skewness	-0.669
Kurtosis	0.062

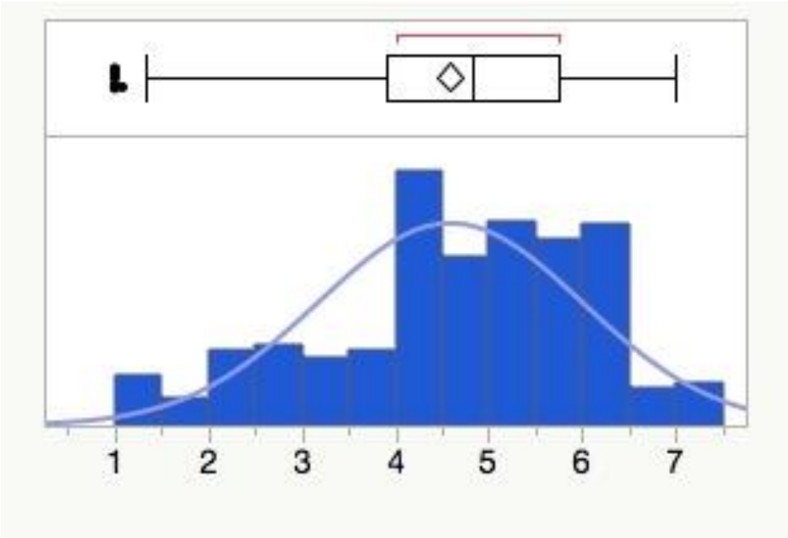
Fitted Normal

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	4.617	4.493	4.740
Dispersion	σ	1.254	1.173	1.348

-2log(Likelihood) = 1311.956

O.9. Summary statistics related to Introduction of System Controls

Introduction of System Controls



Normal	(4.593, 1.419)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		7.000
90.0%		6.083
75.0%	quartile	5.750
50.0%	median	4.833
25.0%	quartile	3.917
10.0%		2.417
2.5%		1.083
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

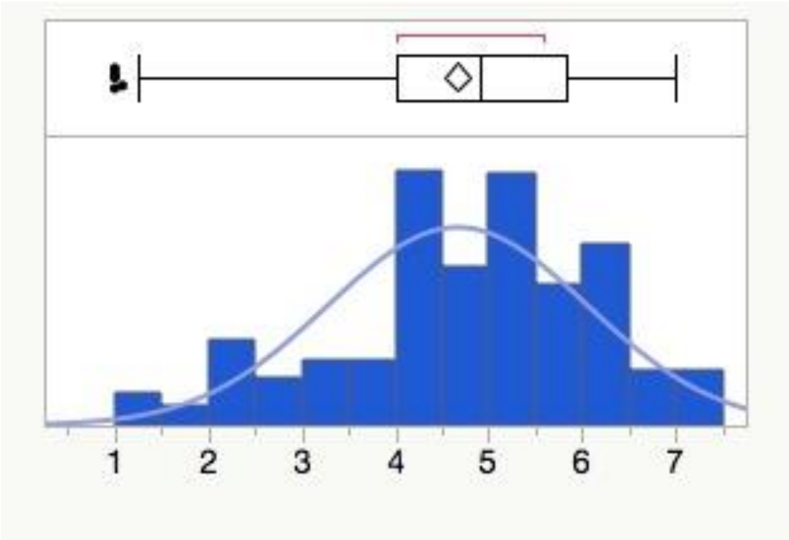
Summary Statistics	
Mean	4.593
Std Dev	1.419
Std Err Mean	0.071
Upper 95% Mean	4.732
Lower 95% Mean	4.453
N	399
Skewness	-0.602
Kurtosis	-0.225

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	4.593	4.453	4.732
Dispersion	σ	1.419	1.327	1.525

-2log(Likelihood) =	1410.526

O.10. Summary statistics related to Introduction of Management Oversight

Introduction of Management Oversight



Normal	(4.672, 1.389)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		7.000
90.0%		6.333
75.0%	quartile	5.833
50.0%	median	4.917
25.0%	quartile	4.000
10.0%		2.500
2.5%		1.500
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

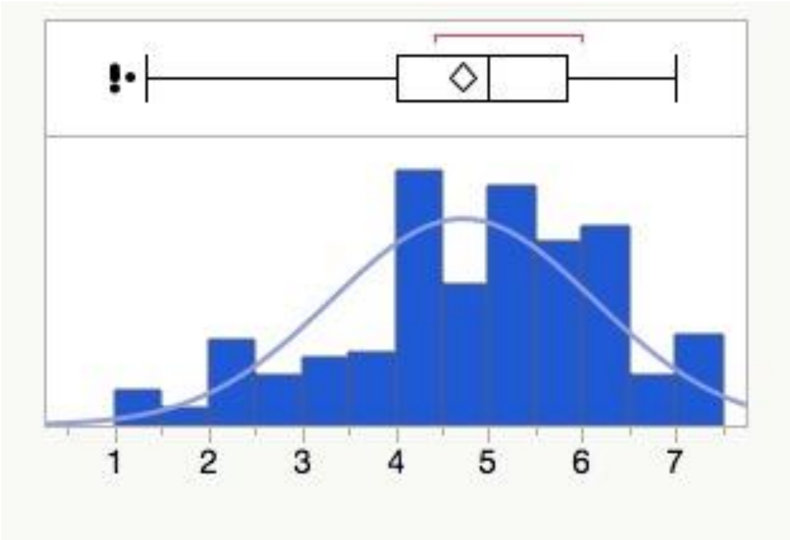
Summary Statistics	
Mean	4.672
Std Dev	1.389
Std Err Mean	0.070
Upper 95% Mean	4.809
Lower 95% Mean	4.535
N	399
Skewness	-0.596
Kurtosis	-0.084

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	4.672	4.535	4.809
Dispersion	σ	1.389	1.299	1.493

-2log(Likelihood) =	1393.488

O.11. Summary statistics related to Influence of Leadership

Influence of Leadership



Normal	(4.726, 1.409)

Quantiles		
100.0%	maximum	7.000
99.5%		7.000
97.5%		7.000
90.0%		6.333
75.0%	quartile	5.833
50.0%	median	5.000
25.0%	quartile	4.000
10.0%		2.667
2.5%		1.500
0.5%		1.000
0.0%	minimum	1.000

Fitted Normal

Summary Statistics	
Mean	4.726
Std Dev	1.409
Std Err Mean	0.071
Upper 95% Mean	4.865
Lower 95% Mean	4.588
N	399
Skewness	-0.580
Kurtosis	-0.126

Parameter Estimates				
Type	Parameter	Estimate	Lower 95%	Upper 95%
Location	μ	4.726	4.588	4.865
Dispersion	σ	1.409	1.318	1.514

-2log(Likelihood) =	1404.907

APPENDIX P: REGRESSION TESTS

P.1. Regression output for:

Influence of Colleagues

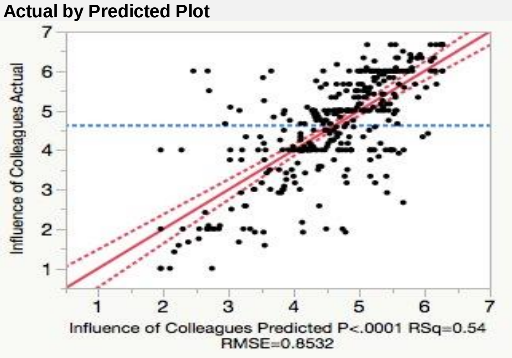
Response Influence of Colleagues

Whole Model

Effect Summary

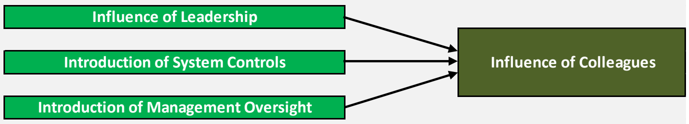
Source	LogWorth	PValue
Influence of Leadership	33.596	0
Introduction of System Controls	2.933	0.00117
Introduction of Management Oversight	0.491	0.32286

Actual by Predicted Plot



Summary of Fit

RSquare	0.540594
RSquare Adj	0.537105
Root Mean Square Error	0.853203
Mean of Response	4.616541
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	338.35807	112.786	154.9354
Error	395	287.5422	0.728	**Prob > F**
C. Total	398	625.90027		<.0001*

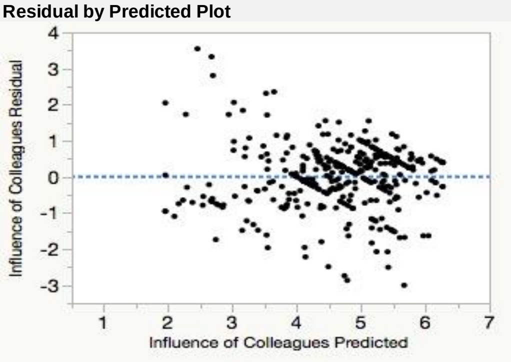
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	352	268.35996	0.762386	1.709
Pure Error	43	19.18224	0.446099	**Prob > F**
Total Error	395	287.5422		0.0168*
				Max RSq
				0.9694

Parameter Estimates

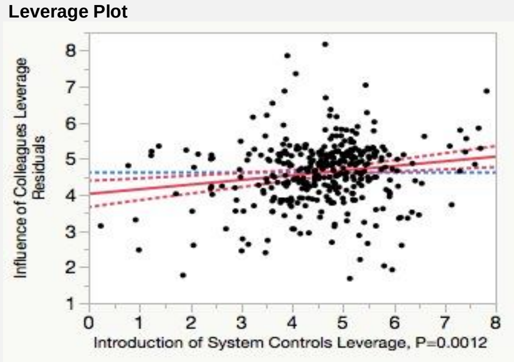
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta
Intercept	1.236252	0.171492	7.21	<.0001*	0.8991009	1.5734032	0
Introduction of System Controls	0.1291597	0.039487	3.27	0.0012*	0.0515279	0.2067915	0.146141
Introduction of Management Oversight	0.0447254	0.045185	0.99	0.3229	-0.044107	0.1335579	0.049537
Influence of Leadership	0.5455067	0.040478	13.48	<.0001*	0.4659276	0.6250857	0.612896

Residual by Predicted Plot



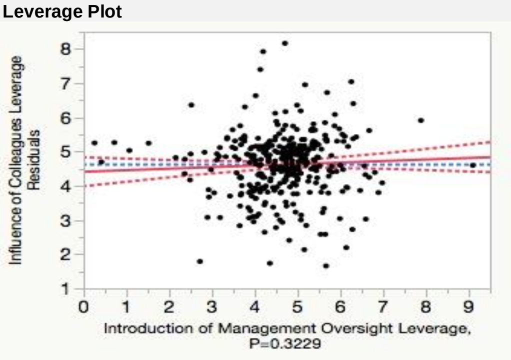
Introduction of System Controls

Leverage Plot



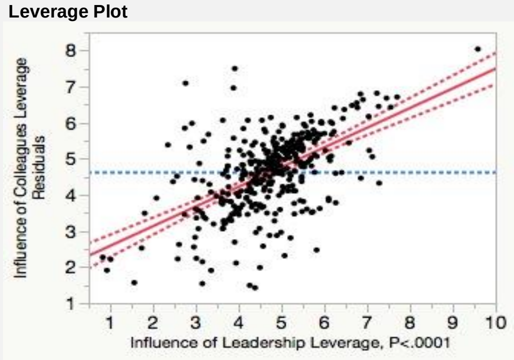
Introduction of Management Oversight

Leverage Plot

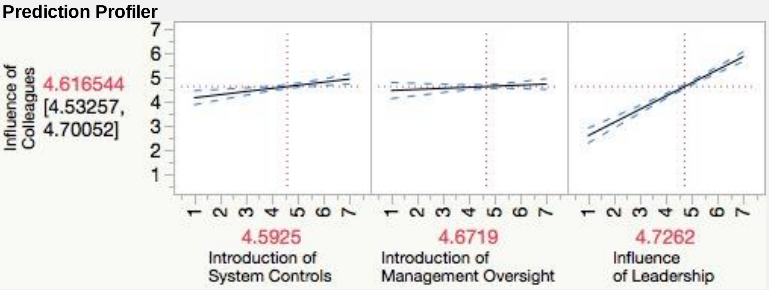


Influence of Leadership

Leverage Plot



Prediction Profiler



P.2. Regression output for:

Behavioural Beliefs & Attitudes

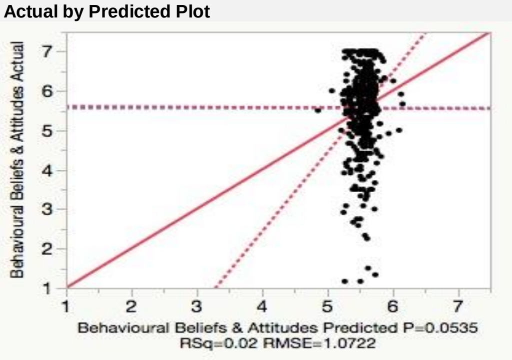
Response Behavioural Beliefs & Attitudes

Whole Model

Effect Summary

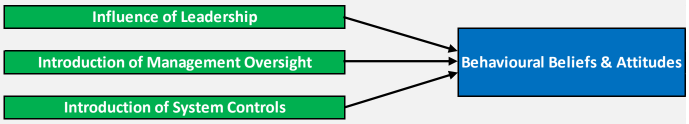
Source	LogWorth	PValue
Influence of Leadership	1.174	0.06707
Introduction of Management Oversight	1.049	0.08936
Introduction of System Controls	1.006	0.09855

Actual by Predicted Plot



Summary of Fit

RSquare	0.019187
RSquare Adj	0.011738
Root Mean Square Error	1.072217
Mean of Response	5.56391
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	8.88368	2.96123	2.5758
Error	395	454.11162	1.14965	**Prob > F**
C. Total	398	462.9953		0.0535

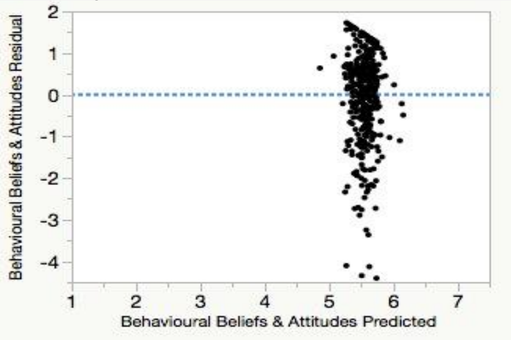
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	352	401.156	1.13965	0.9254
Pure Error	43	52.95562	1.23153	**Prob > F**
Total Error	395	454.11162		0.6561
				Max RSq
				0.8856

Parameter Estimates

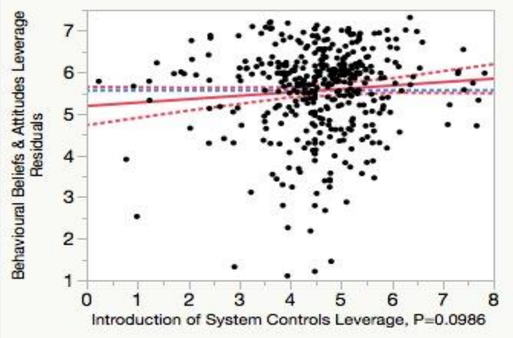
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	5.1968616	0.215513	24.11	<.0001*	4.7731649	5.6205584	0	.
Introduction of System Controls	0.0821677	0.049624	1.66	0.0986	-0.015392	0.1797273	0.108096	1.7163582
Introduction of Management Oversight	-0.096702	0.056783	-1.7	0.0894	-0.208337	0.0149336	-0.12453	2.1534087
Influence of Leadership	0.0934095	0.050868	1.84	0.0671	-0.006597	0.1934163	0.122023	1.7783192

Residual by Predicted Plot



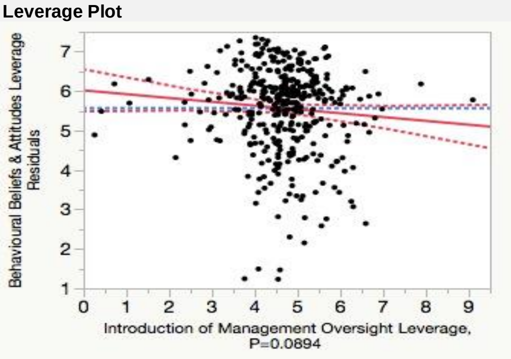
Introduction of System Controls

Leverage Plot



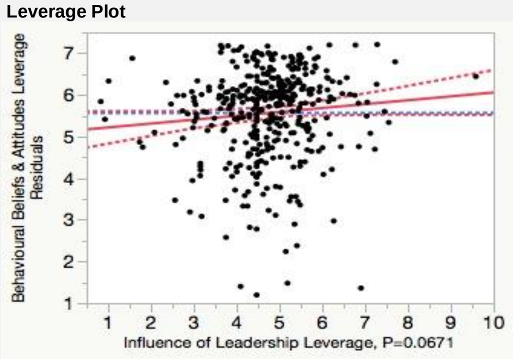
Introduction of Management Oversight

Leverage Plot

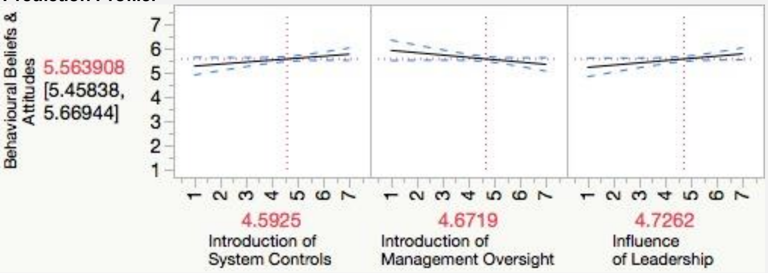


Influence of Leadership

Leverage Plot



Prediction Profiler



P.3. Regression output for:

Behavioural Intention

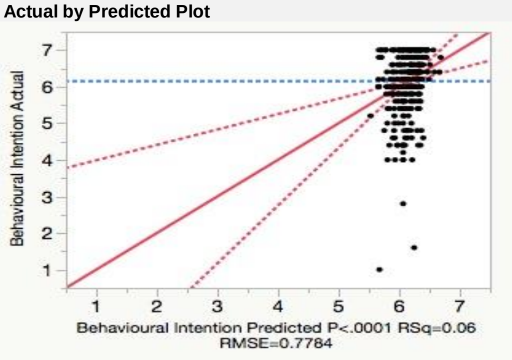
Response Behavioural Intention

Whole Model

Effect Summary

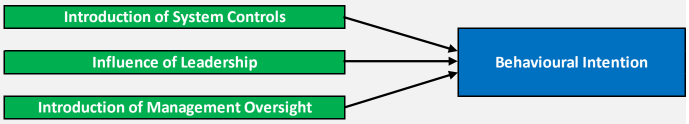
Source	LogWorth	PValue
Introduction of System Controls	3.169	0.00068
Influence of Leadership	1.098	0.07973
Introduction of Management Oversight	0.732	0.18549

Actual by Predicted Plot



Summary of Fit

RSquare	0.056005
RSquare Adj	0.048835
Root Mean Square Error	0.778407
Mean of Response	6.148371
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	14.1993	4.7331	7.8115
Error	395	239.33715	0.60592	**Prob > F**
C. Total	398	253.53644		<.0001*

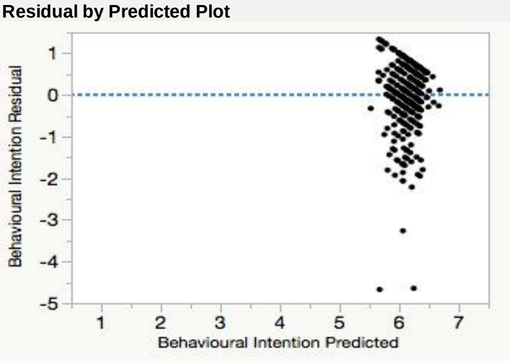
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	352	205.24302	0.583077	0.7354
Pure Error	43	34.09412	0.792887	**Prob > F**
Total Error	395	239.33715		0.9274
				Max RSq
				0.8655

Parameter Estimates

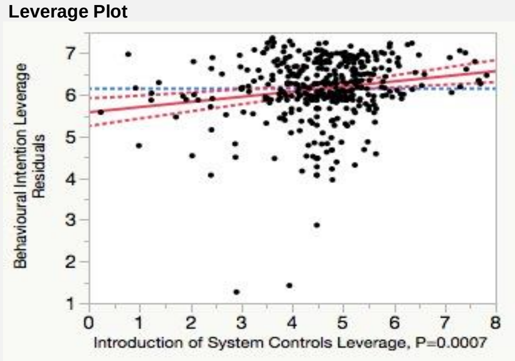
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	5.5304059	0.156458	35.35	<.0001*	5.2228112	5.8380007	0	.
Introduction of System Controls	0.1234161	0.036026	3.43	0.0007*	0.0525899	0.1942423	0.219406	1.7163582
Introduction of Management Oversight	-0.054677	0.041224	-1.33	0.1855	-0.135722	0.0263676	-0.09515	2.1534087
Influence of Leadership	0.0648769	0.036929	1.76	0.0797	-0.007726	0.1374796	0.114527	1.7783192

Residual by Predicted Plot



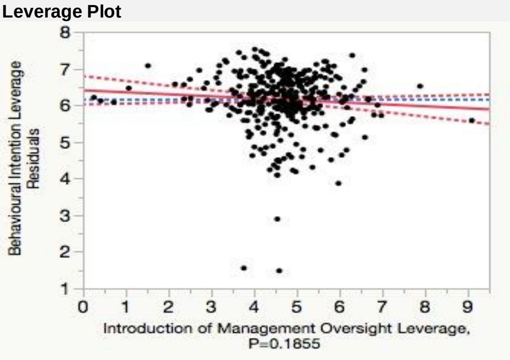
Introduction of System Controls

Leverage Plot



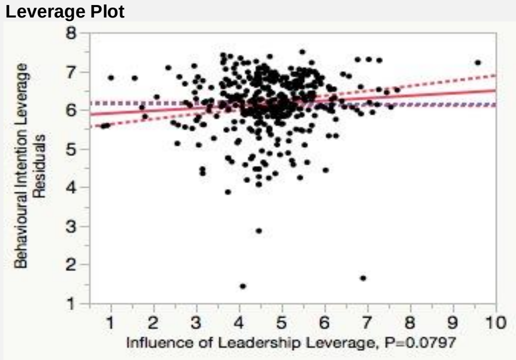
Introduction of Management Oversight

Leverage Plot

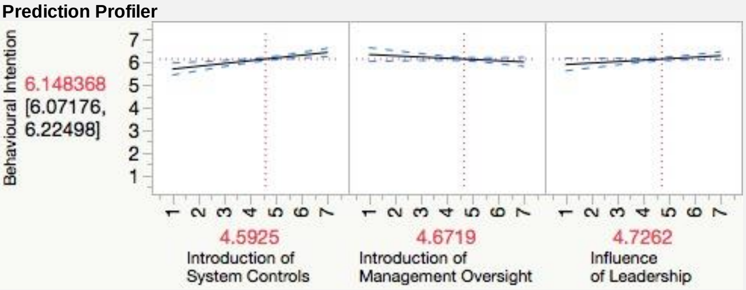


Influence of Leadership

Leverage Plot



Prediction Profiler



P.4. Regression output for:

Introduction of System Controls

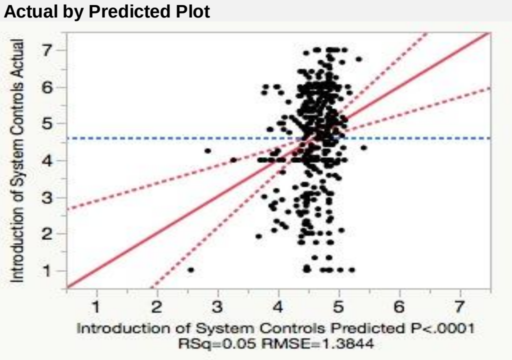
Response Introduction of System Controls

Whole Model

Effect Summary

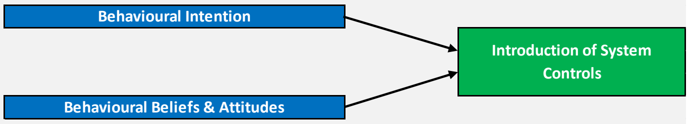
Source	LogWorth	PValue
Behavioural Intention	4.66	0.00002
Behavioural Beliefs & Attitudes	0.813	0.15388

Actual by Predicted Plot



Summary of Fit

RSquare	0.052791
RSquare Adj	0.048007
Root Mean Square Error	1.384436
Mean of Response	4.592523
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	42.30115	21.1506	11.0351
Error	396	758.99849	1.9167	**Prob > F**
C. Total	398	801.29964		<.0001*

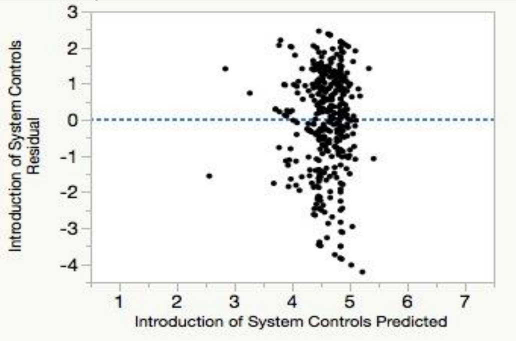
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	332.52319	1.59867	0.7047
Pure Error	188	426.4753	2.26849	**Prob > F**
Total Error	396	758.99849		0.993
				Max RSq
				0.4678

Parameter Estimates

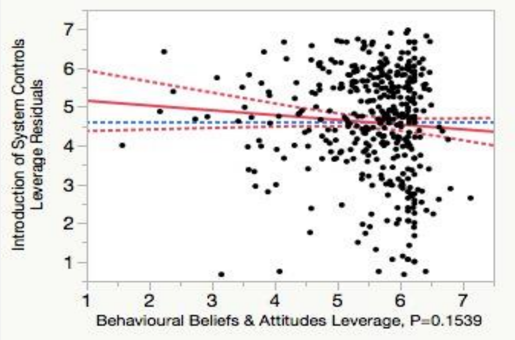
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	2.2062862	0.539072	4.09	<.0001*	1.1464858	3.2660865	0	.
Behavioural Beliefs & Attitudes	-0.122872	0.086004	-1.43	0.1539	-0.291953	0.0462086	-0.0934	1.7867484
Behavioural Intention	0.4993007	0.116221	4.3	<.0001*	0.2708135	0.7277878	0.280857	1.7867484

Residual by Predicted Plot



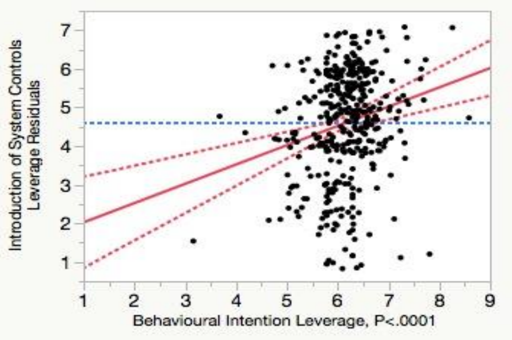
Behavioural Beliefs & Attitudes

Leverage Plot

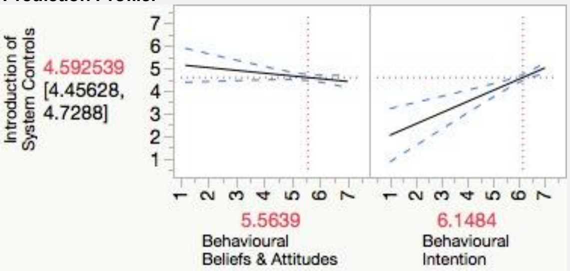


Behavioural Intention

Leverage Plot



Prediction Profiler



P.5. Regression output for:

Introduction of Management Oversight

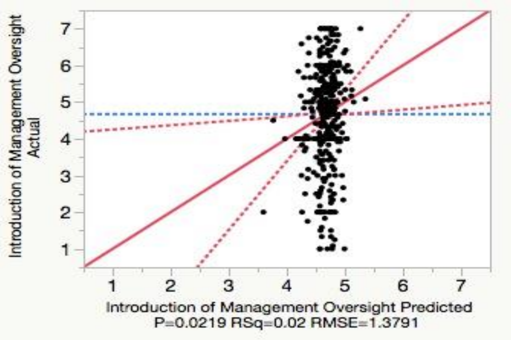
Response Introduction of Management Oversight

Whole Model

Effect Summary

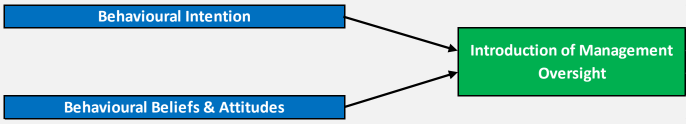
Source	LogWorth	PValue
Behavioural Intention	2.194	0.00639
Behavioural Beliefs & Attitudes	0.858	0.13855

Actual by Predicted Plot



Summary of Fit

RSquare	0.019112
RSquare Adj	0.014158
Root Mean Square Error	1.379071
Mean of Response	4.671888
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	14.67398	7.33699	3.8578
Error	396	753.12764	1.90184	**Prob > F**
C. Total	398	767.80162		0.0219*

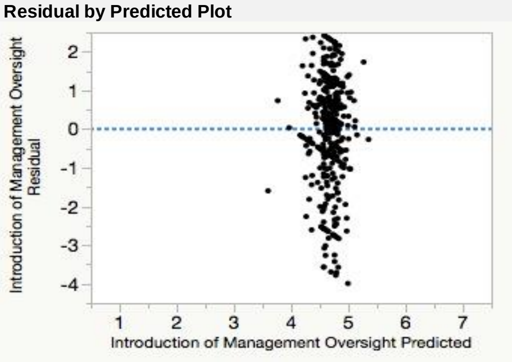
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	391.78252	1.88357	0.98
Pure Error	188	361.34512	1.92205	**Prob > F**
Total Error	396	753.12764		0.5574
				Max RSq
				0.5294

Parameter Estimates

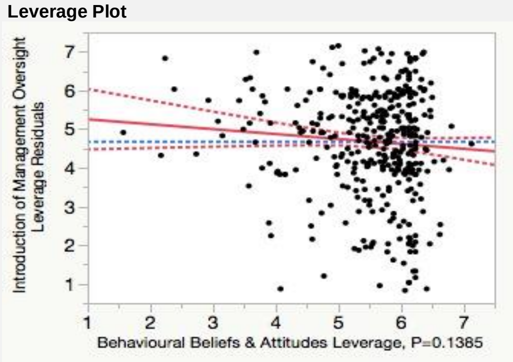
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	3.4280251	0.536983	6.38	<.0001*	2.3723315	4.4837188	0	.
Behavioural Beliefs & Attitudes	-0.127153	0.08567	-1.48	0.1385	-0.295579	0.041272	-0.09874	1.7867484
Behavioural Intention	0.3173739	0.115771	2.74	0.0064*	0.0897722	0.5449757	0.182376	1.7867484

Residual by Predicted Plot



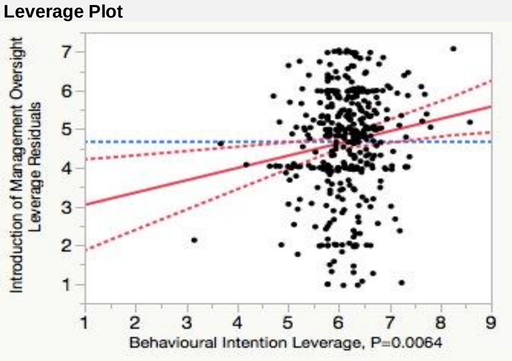
Behavioural Beliefs & Attitudes

Leverage Plot

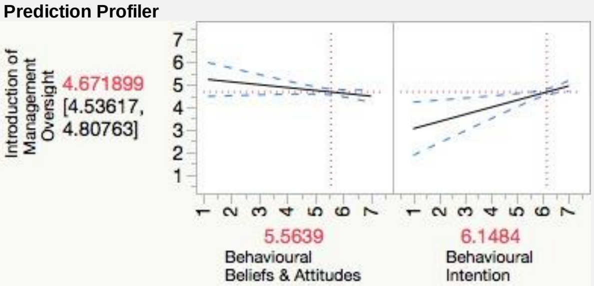


Behavioural Intention

Leverage Plot



Prediction Profiler



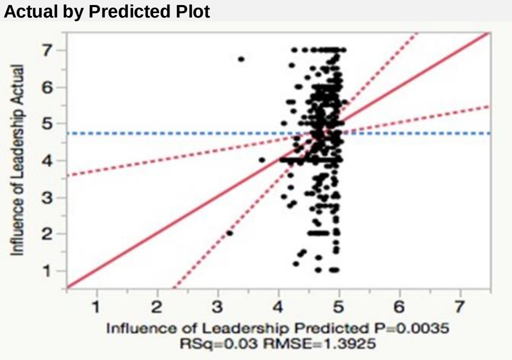
P.6. Regression output for:

Influence of Leadership

Response Influence of Leadership
Whole Model
Effect Summary

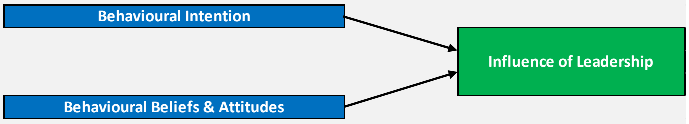
Source	LogWorth	PValue
Behavioural Intention	2.208	0.0062
Behavioural Beliefs & Attitudes	0.14	0.72508

Actual by Predicted Plot



Summary of Fit

RSquare	0.028118
RSquare Adj	0.023209
Root Mean Square Error	1.39251
Mean of Response	4.72619
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	22.21553	11.1078	5.7284
Error	396	767.87773	1.9391	**Prob > F**
C. Total	398	790.09325		0.0035*

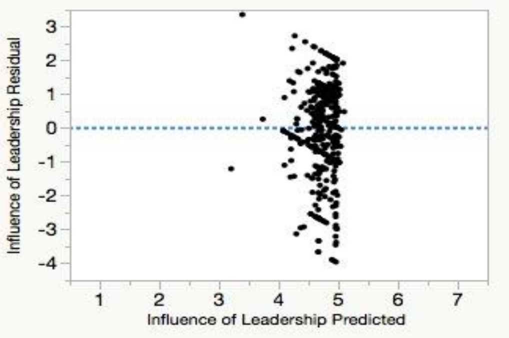
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	391.14793	1.88052	0.9384
Pure Error	188	376.7298	2.00388	**Prob > F**
Total Error	396	767.87773		0.6731
				Max RSq
				0.5232

Parameter Estimates

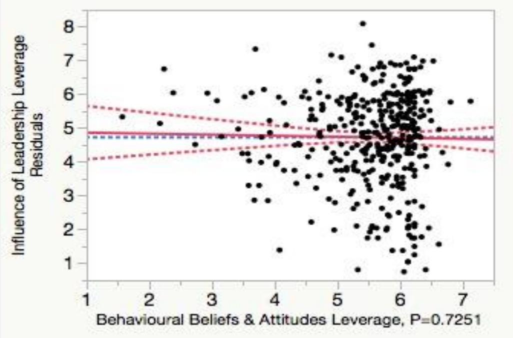
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	2.9176078	0.542216	5.38	<.0001*	1.8516264	3.9835893	0	.
Behavioural Beliefs & Attitudes	-0.030443	0.086505	-0.35	0.7251	-0.20051	0.1396233	-0.0233	1.7867484
Behavioural Intention	0.3217058	0.116899	2.75	0.0062*	0.0918861	0.5515256	0.182238	1.7867484

Residual by Predicted Plot



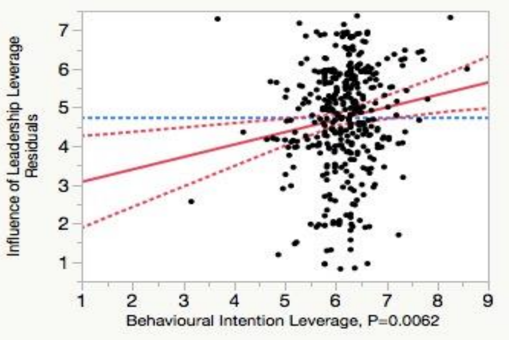
Behavioural Beliefs & Attitudes

Leverage Plot

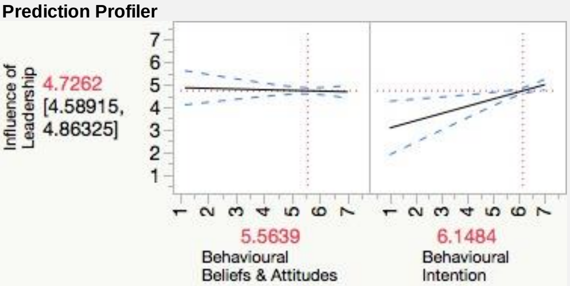


Behavioural Intention

Leverage Plot



Prediction Profiler



P.7. Regression output for:

Unintentional Misuse

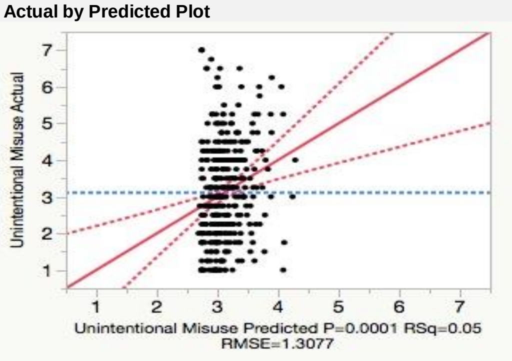
Response Unintentional Misuse

Whole Model

Effect Summary

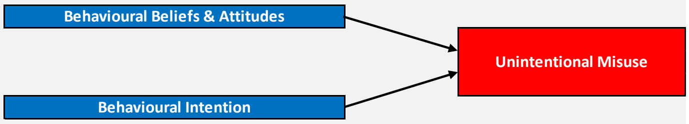
Source	LogWorth	PValue
Behavioural Beliefs & Attitudes	3.359	0.00044
Behavioural Intention	0.202	0.62773

Actual by Predicted Plot



Summary of Fit

RSquare	0.045348
RSquare Adj	0.040526
Root Mean Square Error	1.307729
Mean of Response	3.109649
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	32.16914	16.0846	9.4053
Error	396	677.22121	1.7102	**Prob > F**
C. Total	398	709.39035		0.0001*

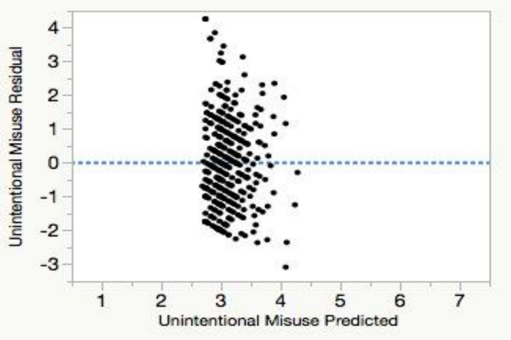
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	334.25283	1.60698	0.8809
Pure Error	188	342.96838	1.8243	**Prob > F**
Total Error	396	677.22121		0.8141
				Max RSq
				0.5165

Parameter Estimates

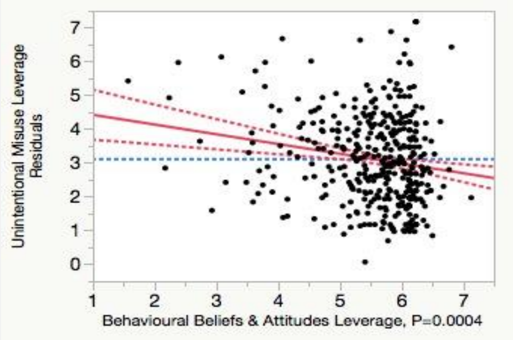
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	4.3850299	0.509204	8.61	<.0001*	3.3839496	5.3861101	0	.
Behavioural Beliefs & Attitudes	-0.288097	0.081238	-3.55	0.0004*	-0.44781	-0.128385	-0.23275	1.7867484
Behavioural Intention	0.0532771	0.109782	0.49	0.6277	-0.16255	0.2691046	0.031851	1.7867484

Residual by Predicted Plot



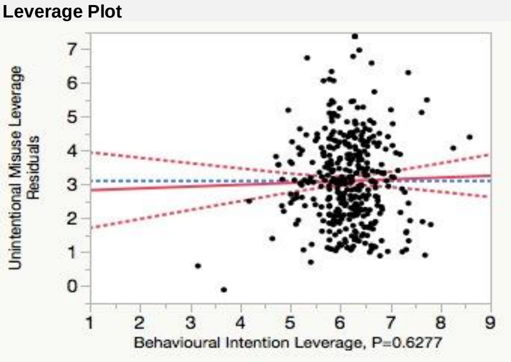
Behavioural Beliefs & Attitudes

Leverage Plot

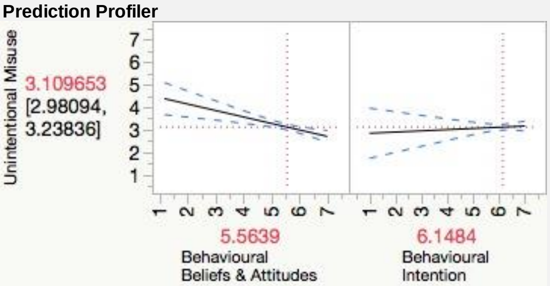


Behavioural Intention

Leverage Plot



Prediction Profiler



P.8. Regression output for:

Passive Disuse

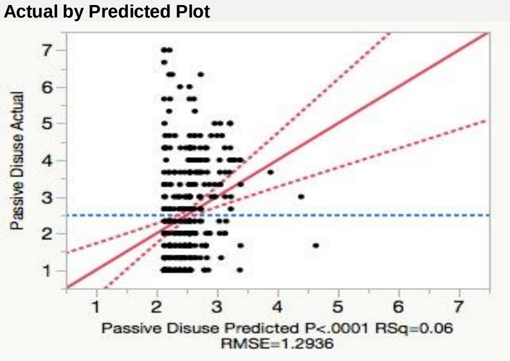
Response Passive Disuse

Whole Model

Effect Summary

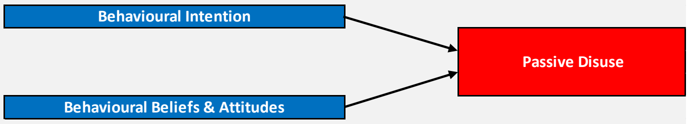
Source	LogWorth	PValue
Behavioural Intention	3.629	0.00023
Behavioural Beliefs & Attitudes	0.072	0.84719

Actual by Predicted Plot



Summary of Fit

RSquare	0.062467
RSquare Adj	0.057732
Root Mean Square Error	1.293615
Mean of Response	2.492063
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	44.15398	22.077	13.1926
Error	396	662.682	1.6734	**Prob > F**
C. Total	398	706.83598		<.0001*

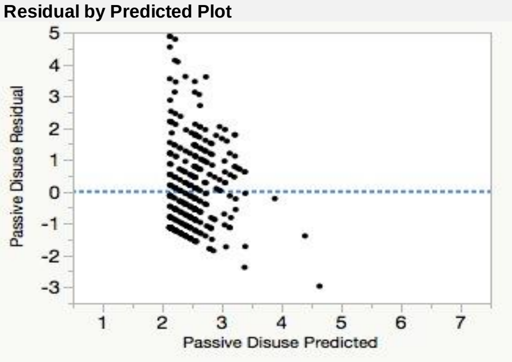
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	319.93213	1.53814	0.8437
Pure Error	188	342.74986	1.82314	**Prob > F**
Total Error	396	662.682		0.8842
				Max RSq
				0.5151

Parameter Estimates

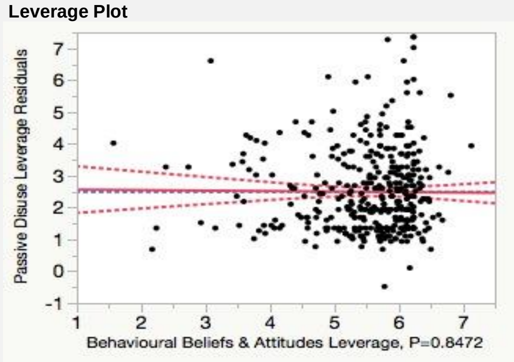
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	5.0568504	0.503708	10.04	<.0001*	4.0665745	6.0471262	0	.
Behavioural Beliefs & Attitudes	-0.015497	0.080362	-0.19	0.8472	-0.173485	0.142492	-0.01254	1.7867484
Behavioural Intention	-0.403125	0.108597	-3.71	0.0002*	-0.616624	-0.189627	-0.24144	1.7867484

Residual by Predicted Plot



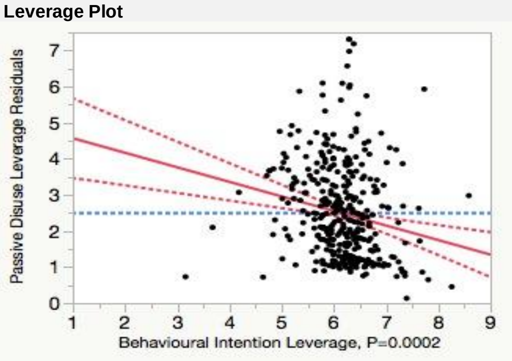
Behavioural Beliefs & Attitudes

Leverage Plot

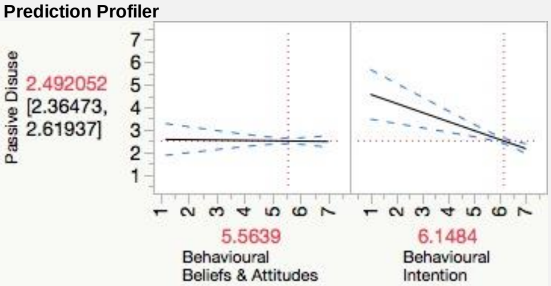


Behavioural Intention

Leverage Plot



Prediction Profiler



P.9. Regression output for:

Active Abuse

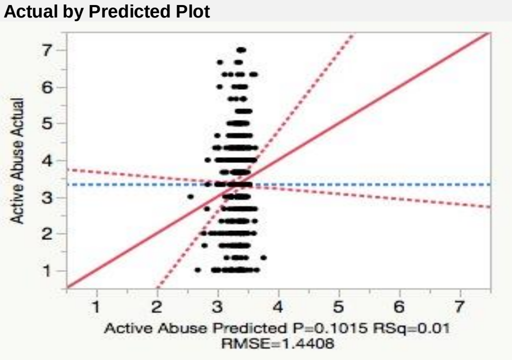
Response Active Abuse

Whole Model

Effect Summary

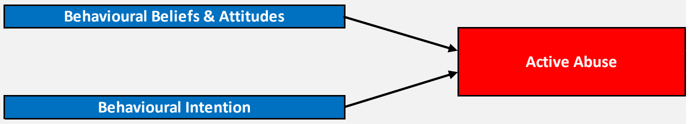
Source	LogWorth	PValue
Behavioural Beliefs & Attitudes	1.306	0.04947
Behavioural Intention	1.277	0.05285

Actual by Predicted Plot



Summary of Fit

RSquare	0.011488
RSquare Adj	0.006496
Root Mean Square Error	1.440836
Mean of Response	3.327485
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	9.55407	4.77703	2.3011
Error	396	822.09896	2.07601	**Prob > F**
C. Total	398	831.65302		0.1015

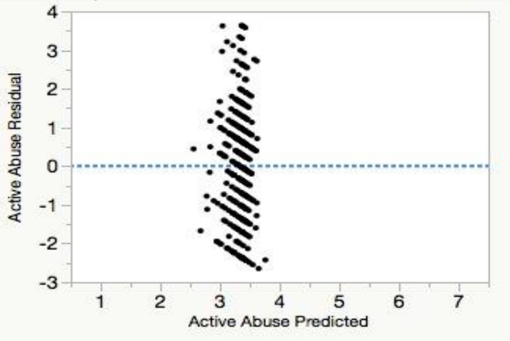
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	414.21601	1.99142	0.9179
Pure Error	188	407.88294	2.16959	**Prob > F**
Total Error	396	822.09896		0.7271
				Max RSq
				0.5096

Parameter Estimates

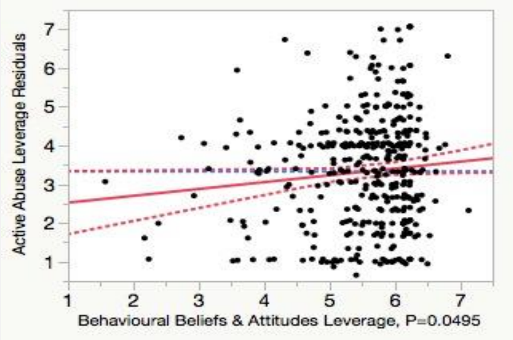
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	3.7903283	0.561033	6.76	<.0001*	2.6873534	4.8933033	0	.
Behavioural Beliefs & Attitudes	0.1763795	0.089507	1.97	0.0495*	0.0004108	0.3523482	0.131603	1.7867484
Behavioural Intention	-0.234892	0.120956	-1.94	0.0528	-0.472687	0.0029035	-0.12969	1.7867484

Residual by Predicted Plot



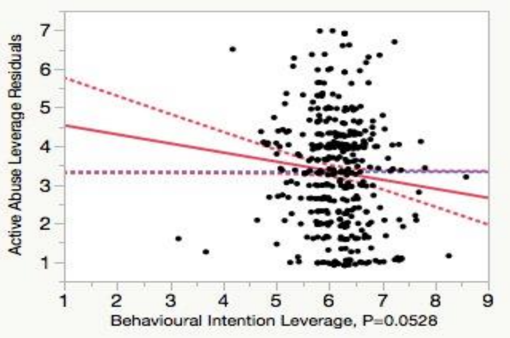
Behavioural Beliefs & Attitudes

Leverage Plot

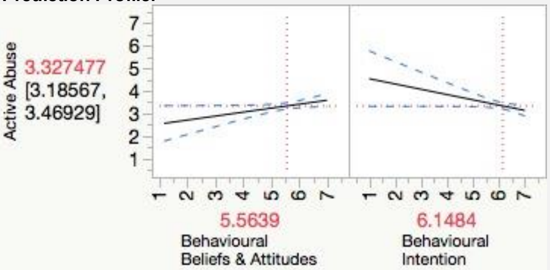


Behavioural Intention

Leverage Plot



Prediction Profiler



P.10. Regression output for:

Intentional Sabotage

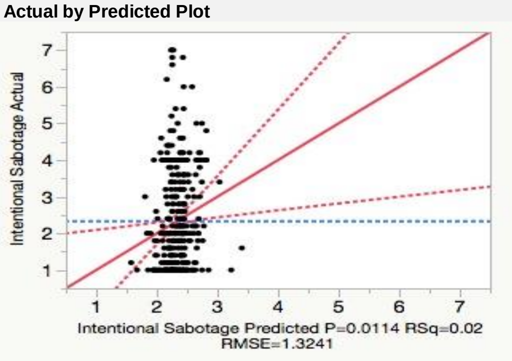
Response Intentional Sabotage

Whole Model

Effect Summary

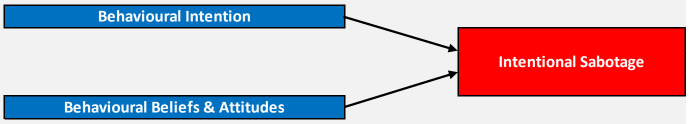
Source	LogWorth	PValue
Behavioural Intention	2.534	0.00292
Behavioural Beliefs & Attitudes	1.11	0.07757

Actual by Predicted Plot



Summary of Fit

RSquare	0.022345
RSquare Adj	0.017408
Root Mean Square Error	1.324077
Mean of Response	2.329323
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	15.86807	7.93404	4.5255
Error	396	694.25885	1.75318	**Prob > F**
C. Total	398	710.12692		0.0114*

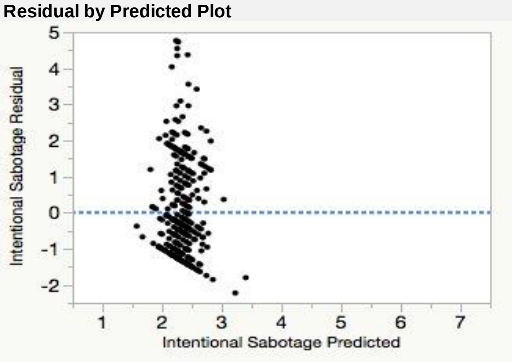
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	208	298.83516	1.43671	0.6831
Pure Error	188	395.42369	2.10332	**Prob > F**
Total Error	396	694.25885		0.9963
				Max RSq
				0.4432

Parameter Estimates

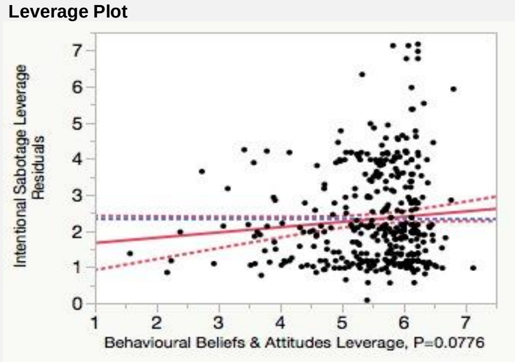
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	3.5659113	0.515569	6.92	<.0001*	2.5523166	4.5795059	0	.
Behavioural Beliefs & Attitudes	0.145553	0.082254	1.77	0.0776	-0.016156	0.3072619	0.117528	1.7867484
Behavioural Intention	-0.332841	0.111154	-2.99	0.0029*	-0.551367	-0.114316	-0.19888	1.7867484

Residual by Predicted Plot



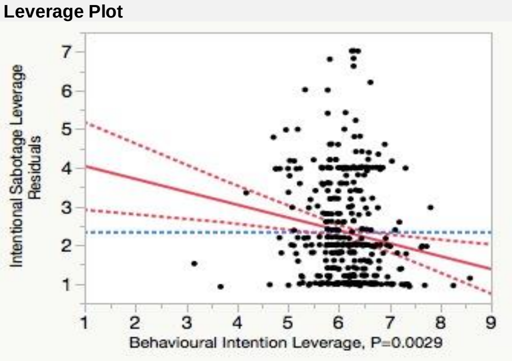
Behavioural Beliefs & Attitudes

Leverage Plot

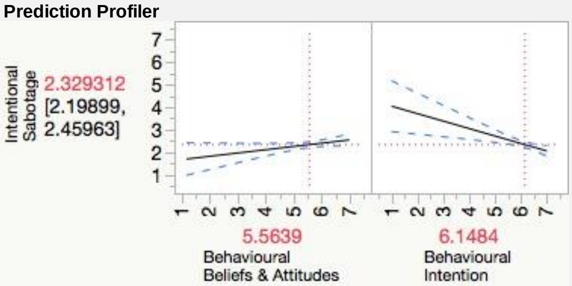


Behavioural Intention

Leverage Plot



Prediction Profiler



P.11. Regression output for:

Behavioural Beliefs & Attitudes

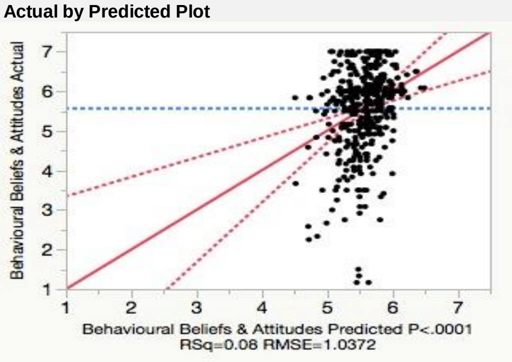
Response Behavioural Beliefs & Attitudes

Whole Model

Effect Summary

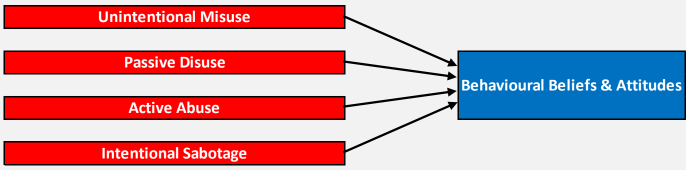
Source	LogWorth	PValue
Unintentional Misuse	3.581	0.00026
Passive Disuse	2.006	0.00985
Active Abuse	1.833	0.01468
Intentional Sabotage	1.023	0.09478

Actual by Predicted Plot



Summary of Fit

RSquare	0.084585
RSquare Adj	0.075291
Root Mean Square Error	1.037168
Mean of Response	5.56391
Observations (or Sum Wgts)	399



Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	39.16239	9.7906	9.1015
Error	394	423.83291	1.07572	**Prob > F**
C. Total	398	462.9953		<.0001*

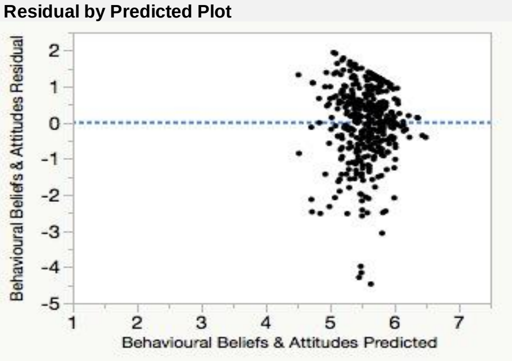
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	363	411.63661	1.13399	2.8823
Pure Error	31	12.1963	0.39343	**Prob > F**
Total Error	394	423.83291		0.0004*
				Max RSq
				0.9737

Parameter Estimates

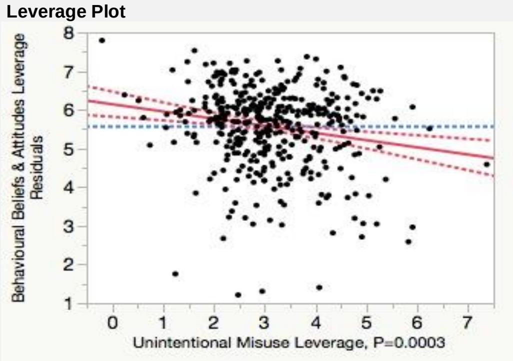
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	5.8976904	0.152146	38.76	<.0001*	5.5985714	6.1968094	0	.
Unintentional Misuse	-0.186014	0.050502	-3.68	0.0003*	-0.285301	-0.086727	-0.23025	1.6819064
Passive Disuse	-0.143425	0.055302	-2.59	0.0099*	-0.252149	-0.034701	-0.17721	2.0095602
Active Abuse	0.1139938	0.046508	2.45	0.0147*	0.0225585	0.2054292	0.152779	1.6722586
Intentional Sabotage	0.0956362	0.057105	1.67	0.0948	-0.016632	0.2079045	0.118441	2.1526988

Residual by Predicted Plot



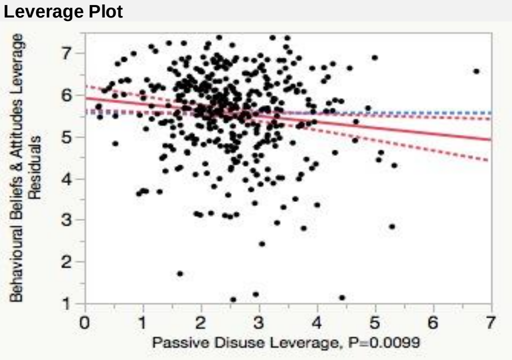
Unintentional Misuse

Leverage Plot



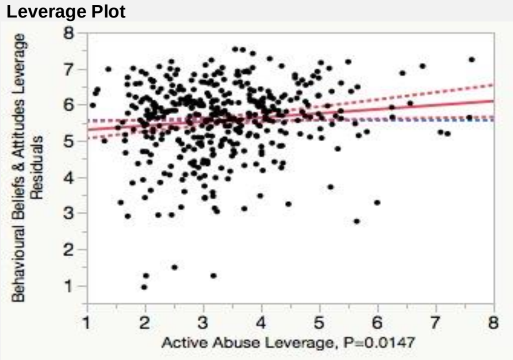
Passive Disuse

Leverage Plot



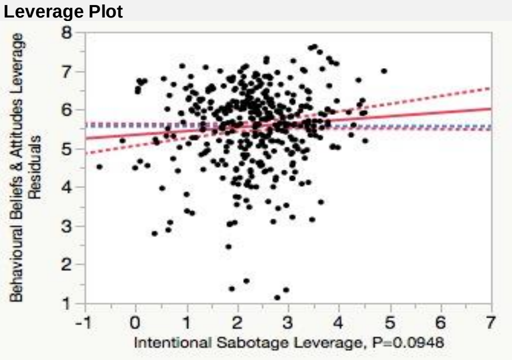
Active Abuse

Leverage Plot

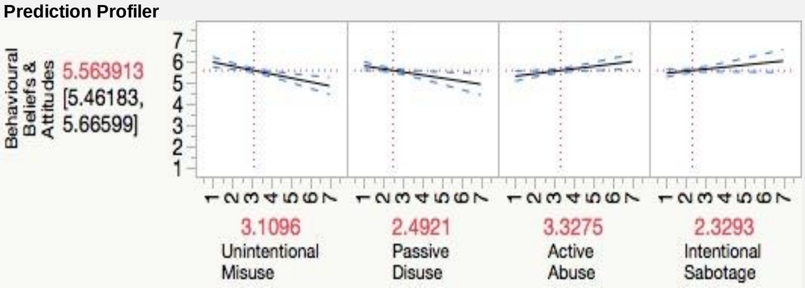


Intentional Sabotage

Leverage Plot



Prediction Profiler



P.12. Regression output for:

Behavioural Intention

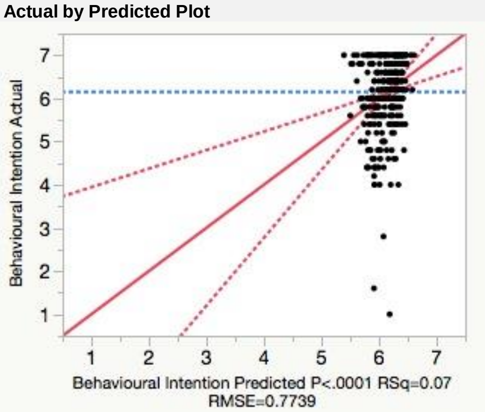
Response Behavioural Intention

Whole Model

Effect Summary

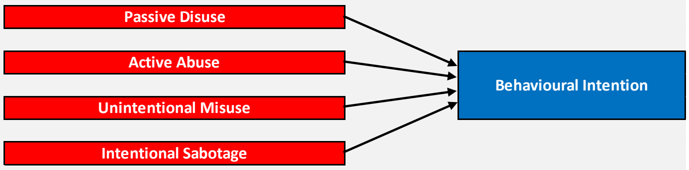
Source	LogWorth	PValue
Passive Disuse	4.947	0.00001
Active Abuse	0.742	0.18127
Unintentional Misuse	0.149	0.70882
Intentional Sabotage	0.031	0.93144

Actual by Predicted Plot



Summary of Fit

RSquare	0.069338
RSquare Adj	0.05989
Root Mean Square Error	0.77387
Mean of Response	6.148371
Observations (or Sum Wgts)	399



Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	17.57969	4.39492	7.3386
Error	394	235.95675	0.59887	**Prob > F**
C. Total	398	253.53644		<.0001*

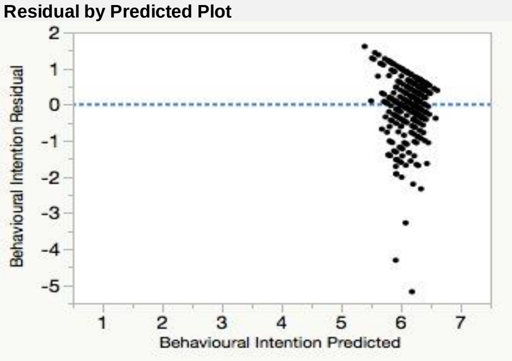
Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	363	224.69275	0.618988	1.7035
Pure Error	31	11.264	0.363355	**Prob > F**
Total Error	394	235.95675		0.0366*
				Max RSq
				0.9556

Parameter Estimates

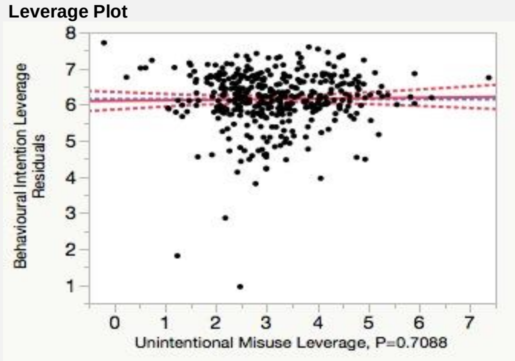
Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%	Std Beta	VIF
Intercept	6.3987532	0.113522	56.37	<.0001*	6.1755693	6.6219371	0	.
Unintentional Misuse	0.014082	0.037681	0.37	0.7088	-0.06	0.0881636	0.023555	1.6819064
Passive Disuse	-0.183524	0.041263	-4.45	<.0001*	-0.264647	-0.102401	-0.30643	2.0095602
Active Abuse	0.046473	0.034702	1.34	0.1813	-0.02175	0.1146963	0.084169	1.6722586
Intentional Sabotage	0.003668	0.042608	0.09	0.9314	-0.0801	0.0874356	0.006139	2.1526988

Residual by Predicted Plot



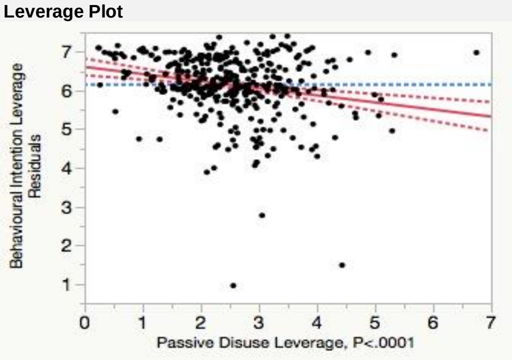
Unintentional Misuse

Leverage Plot



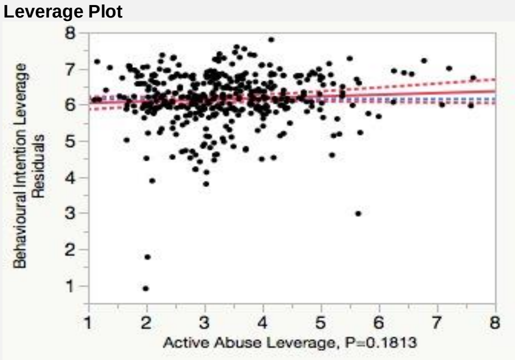
Passive Disuse

Leverage Plot



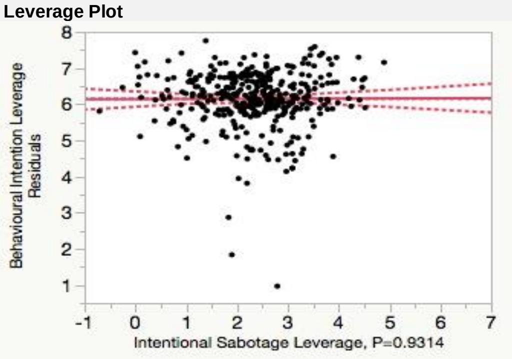
Active Abuse

Leverage Plot

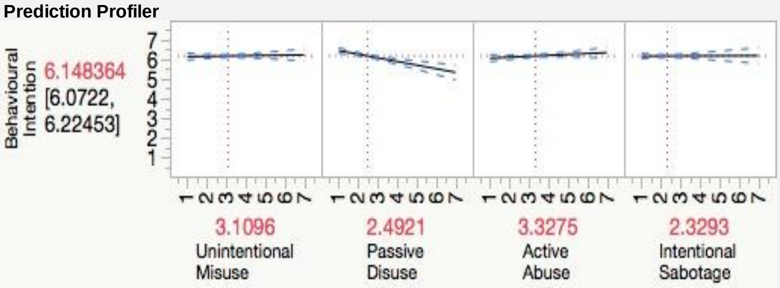


Intentional Sabotage

Leverage Plot



Prediction Profiler



APPENDIX Q: FOCUS GROUP FEEDBACK
Feedback on Presentation of Archetypical Model to Focus Group

No.	Questions	Responses
1.	Do you agree that the Wixom & Todd Research Model serves as an explanatory antecedent to the Technology Acceptance Model?	**Participant-01:** Yes I agree. It provides the external variables which is a good flow into the Technology acceptance model. **Participant-02:** Yes. **Participant-03:** Yes agree. **Participant-04:** Yes, I am new in the environment and by Chris explaining the two models I agree and understand the link. **Participant-05:** Yes. **Participant-06:** Yes. **Participant-07:** Yes. **Participant-08:** Yes I agree because it outlined antecedents for the Technology Acceptance Model.
2.	Do you agree that the Technology Value Model serves as an explanatory decedent to the Technology Acceptance Model?	**Participant-01:** Yes, I agree the Technology Acceptance Model provides the catalyst for the Technology Value Model. **Participant-02:** Yes, it fits seamlessly. **Participant-03:** Yes I agree. **Participant-04:** Yes. **Participant-05:** Yes. **Participant-06:** Yes. **Participant-07:** Yes. **Participant-08:** Yes, I do agree with the technology value model as it outlines the critical solutions to address value eroding behaviour.
3.	To what extent do you think the Value Eroding Behaviour Constructs in the Technology Value Model explain value eroding behaviour of employees interacting with computer systems? Do you think there are any construct gaps, if so, please provide an example?	**Participant-01:** The constructs listed provide the overall themes e.g. something like collusion would fall under Intentional Sabotage. **Participant-02:** It seems to fit conventional thought and culture. **Participant-03:** I think the constructs are adequately covered, I can't think of any gaps. **Participant-04:** Fully, I learned so much during the workshop. **Participant-05:** Addressed to a sufficient degree – about 80%. I think any exception identified will be assessed according to the beliefs, behaviours and intentions which can therefore be categorised into one of the four value eroding behaviour constructs. **Participant-06:** No, I think all behaviours are covered. If training is not provided it will fall into unintentional misuse. **Participant-07:** I think it is covered to a great extent i.e. 85%, any gaps or variety will be due to individual's behaviour, personality, beliefs etc. **Participant-08:** I think it addresses almost 90% of the value eroding behaviour, as for the 10% gap, this can occur through human behaviour and belief.
4.	To what extent do you think the Value Eroding Mitigation Constructs in the Technology Value Model explain mitigating options available to organisations to minimise value eroding behaviour of employees interacting with computer systems? Do you	**Participant-01:** From a logical control perspective, this provides the overall required mitigation similar to the eroding behaviours. **Participant-02:** I don't think anything is missing. However, as technology and how we interact with it changes, human behaviour may change and so may values. That's just to give an opposing view point. **Participant-03:** The only additional mitigating option is the one which was already mentioned, change management and

	think there are any construct gaps, if so, please provide an example?	staff awareness/ training. **Participant-04:** None. **Participant-05:** The value eroding behavioural constructs are addressed adequately. **Participant-06:** Testing, training, change management. **Participant-07:** Addressed effectively and efficiently. **Participant-08:** Yes, I think all the mitigants outlined in the Value Eroding Mitigating Construct result in the decrease in the residual value eroded.
5.	Please provide an **example** of how you think the Technology Value Model can be **applied** in the **workplace** to:	
5.a.	Identify value eroding behaviour.	**Participant-01:** A user working on a core system for many years following a set sequence or procedure within a process, however, additional sequences added to the system with no impact on the output. The user might not be open to change and not follow the new procedure. **Participant-02:** I think it covers these concepts well; I have nothing more to add. **Participant-03:** Night shift staff actively abusing the system by browsing inappropriate websites, downloading videos, music etc. and participating in online dating or chat sites. **Participant-04:** Cyber-attacks. **Participant-05:** When new systems are introduced to an environment, there is generally a lack of buy-in from all parties from top management down to operations level. This is also prevalent with users who have worked on a system for a long time and pass on the negativity around the use of such a system to new users, e.g. Living Disaster Recovery Planning System. **Participant-06:** Assist to predetermine behavioural beliefs, attitudes and intentions. **Participant-07:** Resistance to change. **Participant-08:** Spending more time in the internet looking for a job with the company network than doing actual work.
5.b.	Mitigate value eroding behaviour.	**Participant-01:** Influence of leaders on staff to behave in an appropriate manner. **Participant-02:** I think it covers these concepts well. **Participant-03:** Mitigating value eroding behaviour may be the introduction of management oversight by monitoring internet activity and reporting on the top 10 internet users and the introduction of system controls by blocking certain websites. **Participant-04:** Stop cyber attackers. **Participant-05:** With the use of the Value Eroding Mitigation Constructs, there is a coercive influence on people, mandatory requirements from processes and systems controls that are put in place. External factors have been excluded. **Participant-06:** Adapt training and change management to address behavioural beliefs, attitudes and intentions. **Participant-07:** The change management process will be of great help to mitigate the behaviour when new strategic initiatives are introduced into the business. **Participant-08:** Policies and controls must be in place to prevent such incidents.
6.	Please provide any other observations or comments on the practical application of the Technology Value	**Participant-01:** This model is definitely relevant to any small, medium or large enterprise; albeit on different scales. A large organisation that initiates change in line with a new strategy, business objectives, etc. can use the technology value model as

	Model that may be of help to the researcher.	a conduit to assess potential eroding behaviour and determine the relevant mitigation construct required to manipulate the BAI in order to have a limiting impact on the value eroding behaviour. **Participant-02:** How does it work in a non-hierarchical environment? Do employees have the same eroding behaviour? **Participant-03:** Can't think of anything else. **Participant-04:** None. **Participant-05:** None. **Participant-06:** None. **Participant-07:** None. **Participant-08:** The model may provide awareness to humans using technology.